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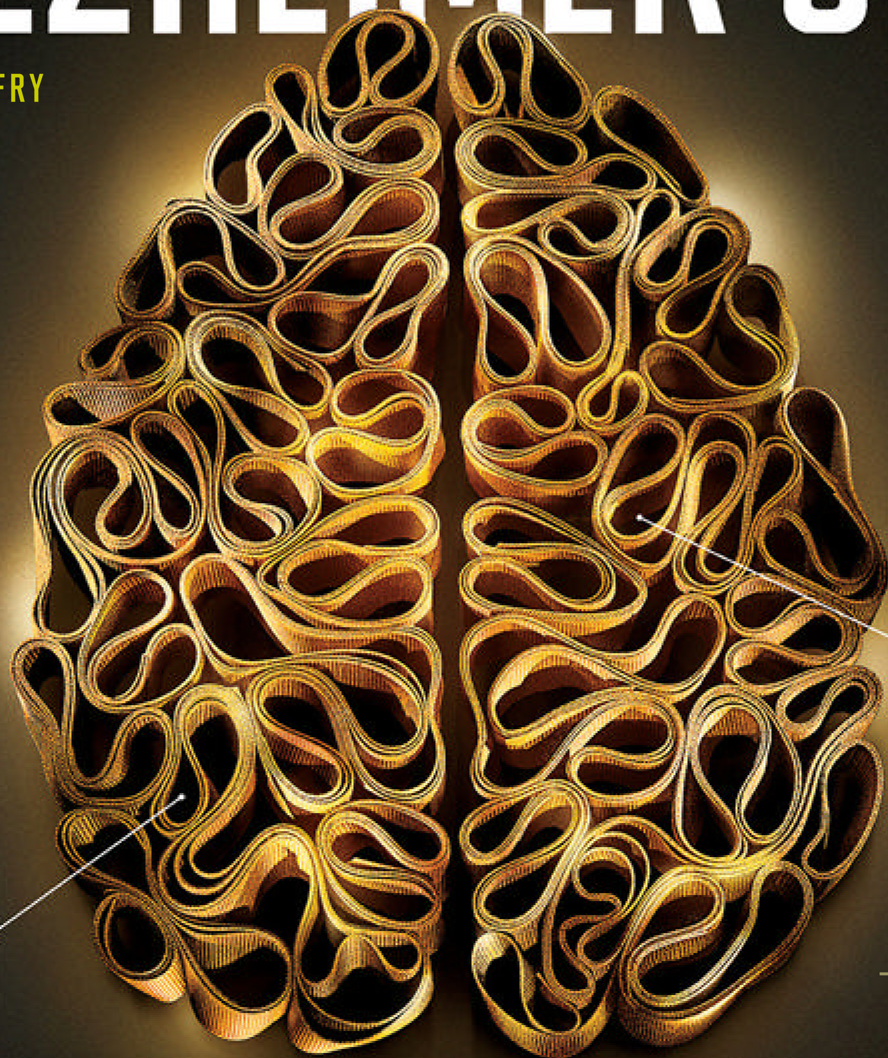

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May 1, 2015 Volume 171 Number 6

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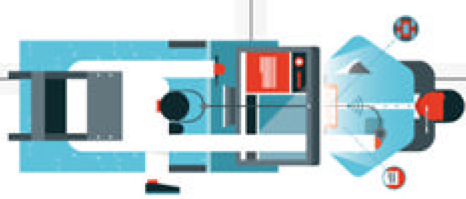

Venture

CORRECTIONS
Editor's Desk (March 15, 2015) incorrectly credited the inside cover pictured above. The typography is by Like Minded Studio. "Becoming Tim Cook" (April 1) misstated that the launch of Apple's Siri product occurred days after Steve Jobs' death. It was the day before. *Fortune* regrets the errors.


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The New Industrial Revolution
(And Our Giga-Good Fortune)

THE COLLAPSE of the respected tech website Gigaom was an unfortunate surprise for its devoted readers and talented journalists. But for *Fortune* and our readers, it has turned into an opportunity.

The Gigaom journalists have been leaders in covering the technologies that are transforming the very foundations of global business—cloud and mobile computing; big data and machine learning; sensors and intelligent manufacturing; advanced robotics and drones; and clean-energy technologies. Together these innovations are hurtling us toward a new industrial revolution. Savvy corporate leaders know that they have to either figure out how these technologies will transform their businesses or face disruption by others who figure it out first.

That's why I am thrilled that we are bringing the very best of what Gigaom had to offer—six of that site's finest and most plugged-in reporters—into the *Fortune* fold. I am pleased to welcome Stacey Higginbotham, Mathew Ingram, Barb Darrow, Katie Fehrenbacher, Jeff John Roberts, and Jonathan Vanian into our already prodigious team of tech journalists, led by assistant managing editor Adam Lashinsky. (Stacey kicks things off this issue with a story on "block chain" tech on page 58.)

Technology coverage has long been a focus of *Fortune*'s journalism. But increasingly we recognize that this revolution is not just about the technology industry—but about every industry. And it is not just the concern of the chief information officer and the chief technology officer; it is the concern of every executive in every job in every industry who is focused on business success.

Fortune is honored to be your guide through these tumultuous technological times. This is the motivating spirit that guides our fast-growing digital efforts, our award-winning print magazine, and our distinguished and expanding conferences. We hope you'll continue to join us on the journey. We all have a lot to learn.

ALAN MURRAY
Editor
@alansmurray

ILLUSTRATION BY **MARTIN LAKSMAN**

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MAY 1, 2015

Macro

CLOSER LOOK

By Sue Callaway

Assembling the Chevrolet-FNR concept car at GFMI Metalcrafters' California factory

PHOTOGRAPH BY CODY PICKENS

CHEVY'S SELF-DRIVING MUSCLE CAR

Chevrolet celebrated its 10th anniversary in China by unveiling an over-the-top concept car that promises terrific driving performance—unless you'd rather let it drive itself. Chevy parent General Motors gave *Fortune* an exclusive look at this daring experiment.

TUCKED AWAY in a nondescript commercial building in Fountain Valley, Calif., dozens of designers, engineers, and craftsmen have toiled secretively for months on a project that offers a glimpse of the way we may be driving 15 years from now. Their hangar-like work space belongs to GFMI Metalcrafters, a company that for decades has built many of the most important concept cars to hit the auto-show circuit. Laboring furiously in its password-protected workrooms, these teams have been assembling a car so far ahead of its time, some of the technologies and materials it requires don't exist yet.

GM's Chevrolet-FNR: A mass-market concept aimed at China's youth, it debuted in April at the Shanghai auto show.

LEADERS IN THE DRIVERLESS RACE

HERE ARE SOME OF THE LATEST ADVANCES IN AUTONOMOUS VEHICLES FROM TOP PLAYERS IN THE INDUSTRY.

Daimler-Benz unveiled the F 015 AV concept in January; Mercedes's Distronic Plus is the market's most advanced assisted-driving system.

Audi put a road-legal AV into action in January, and Delphi sent a sensor-loaded autonomous Audi coast to coast.

Tesla CEO Elon Musk promised to have software-based autopilot systems on the road by this summer.

Volvo has set a goal of zero collision fatalities in its new vehicles by 2020 based on its active-safety systems.

That car is the Chevrolet-FNR, perhaps Chevy's most unusual concept car to date, and a stake-in-the-ground statement from Chevy's parent, General Motors. The FNR is a fully autonomous—that is, self-driving—electric vehicle, developed by PATAC, GM's joint venture with Chinese automaker SAIC Motors. It's a family-sedan-cum-techno-infotainment solution aimed squarely at China's youth market, consumers who characteristically respond better to smartphones than to sheet metal. Chevy unveiled the car at the 2015 Shanghai motor show; *Fortune* got a sneak peek as it prepared for its debut.

Chevy hopes the FNR will hook millennials worldwide with the promise of a vehicle that will be part Siri, part BFF, and part Fitbit. "Everywhere in the world our time is constrained—commute time, work time, family time," says Sharon Nishi, head of sales and marketing for Chevy's operations in China. "Those are some of the things that inspired this car." And in a departure from current trends in autonomous-vehicle development, Chevy is aiming the FNR at the mass market. GM projects that by 2030—the hypothetical model year for the FNR—self-driving technologies will be prolific enough to have become less costly, and therefore feasible for a real-world family car. And its executives think autonomous vehicles have a great chance of proliferating in developing countries like China, where cities and roads are crowding quickly, governments need to resolve congestion, and much infrastructure is yet to be built.

The FNR's exterior projects futuristic muscle-car attitude. Motors housed in the rims of its massive, hubless wheels will power the car (once that innovation is developed). The FNR's sculpted exterior panels are made from composites like carbon fiber to save weight and designed with air intakes that add drama and aerodynamic flow to the overall shape. Double scissor doors open on each side like lotus blossoms. The crowning touch: Thousands of LEDs swathe the vehicle, illuminating it outside and in with a bright blue light, an ode to Shanghai's famous evening light shows from chief designer Cao Min and his team at PATAC.

The interior, on the other hand, promises that driving itself can be an afterthought, if the user chooses. The FNR would allow occupants to sit back and enjoy the ride in motorized, webbed seats that can read everything from heart rate and blood pressure to mood—and adjust temperature, speed, lighting, and even musical selections for those who want to work or sleep. Care to swap out the map projected on the oversize canopy and work on some spreadsheets? Simply swipe your hand over the gesture-controlled crystal ball in the center console to reconfigure the display. Of course, that's assuming you're in the car at all. The FNR could "run errands for you while you're at work or take itself to the dealer for service," says Mark Reuss, GM's executive vice president of global product development.

There's much work to be done before cars come close to fulfilling the FNR's fully autonomous

FNR: CHINAFOTOPRESS VIA GETTY IMAGES; ALL OTHER CARS COURTESY OF THE COMPANIES

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A new era of manufacturing has dawned, one where manufacturers in every industry are relying on a highly skilled workforce and intelligent hardware and software to produce more complex products more efficiently than ever before. And they're turning to Siemens to get it done.

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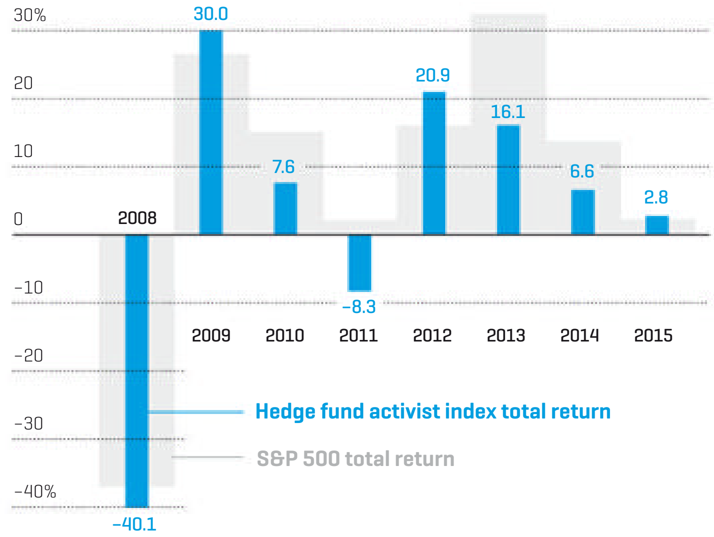
promise. Like other manufacturers, GM has gradually loaded more vehicles with active-safety technologies that are precursors to a car that could pilot itself—night vision, adaptive cruise control, brake assist. Autonomous driving has claimed a significant share of the more than $7 billion GM has spent annually on research and development over the past three years: Next year GM aims to be the first automaker to bring vehicle-to-vehicle communication—cars "talking" to one another to avoid collisions—to market, in a 2017 Cadillac CTS. "It's a step-by-step progression. Some of the things we introduced in 2010 and 2011 are now trickling down into our production cars," says John Capp, GM's global director of safety strategies and vehicle programs.

Other, more luxury-oriented companies, including Audi and Mercedes-Benz, are closer to putting autonomous vehicles on the road. But GM executives say that by 2030, that may not matter. "How will the consumer interface with and experience all this technology? Will it really help, or will it become a secondary burden?" asks Bryan Nesbitt, GM China vice president of design. The automakers that integrate the tech most successfully, Nesbitt says, will come out ahead.

Back at Metalcrafters last month, such competitive macro-musings seemed far away as the craftsmen raced to finish the prototype "build," attaching the last of the thousands of hand-painted body panels and testing the more than 240 feet of LED lighting. At last, one technician delicately remote-controlled the 192-inch-long wonder into a specially built shipping container—its home until arrival in Shanghai. ■



HEDGE FUNDS

Actively Mediocre

ACTIVIST INVESTORS SCOLD CEOs OVER STOCK PRICES, BUT THEIR OWN RETURNS ARE JUST SO-SO. *By Anne VanderMey*

THERE'S NO question that activist investors are ascendant. Increasingly a force in even the most elite boardrooms, these shareholder standard-bearers agitate for change, aiming to boost the profit and stocks of their target companies. And most often, they're hedge fund managers who, in the process, charge their clients gaudy fees (typically 2% per year plus 20% of any gains).

But how are the returns of the activists' own funds? Taken as a whole over the past seven years... not all that great.

According to data compiled by research firm HFR, activists beat the S&P only three years out of the past eight, including by a narrow margin so far in 2015. "They can dish it out, but they can't take it," says Yale School of Management professor Jeffrey Sonnenfeld, who for years has been sounding the alarm about funds he thinks squeeze companies for short-term gains. If you invested in the average activist hedge fund at the start of 2008, your cumulative return today would be 19% after fees, according to HFR; for the S&P 500, with dividends, it would be 65%.

Hedge fund defenders say it's unfair to look at such a short time frame (2008 was the first year HFR tracked activist performance on its own). Plus, HFR's index looks at a universe of more than 70 firms, not all of them stars. The average obscures performances like that of Sonnenfeld critic Nelson Peltz, who says the flagship fund of his Trian Fund Management has notched a 137% return after fees since its 2005 inception. (The comparable figure for the S&P would be just over 100%.)

Should CEOs follow the activists? That's a tricky call. For average investors (most of whom couldn't get access anyway), the answer is a lot easier: Stick with an index fund.

GRAPHIC SOURCE: HEDGE FUND RESEARCH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ANGST AT THE TOP

THE RISE OF THE CEO SUPPORT GROUP

A new class of executive coach tells leaders, "You're not alone." *By Erin Griffith*

WITH GREAT POWER comes great insecurity. More than any other fear, modern CEOs are stricken by "impostor syndrome," according to a recent survey published by *Harvard Business Review*. They fret that they don't know what they're doing and the world will find out.

That dread is more acute, and perhaps appropriate, in the world of startups, where many CEOs are first-time managers forging brand-new business models. In other words, they're making it up as they go. Throw in venture capital money, designed to supercharge a company for crazy growth, and you get extreme pressure to hire faster, spend faster, and sell faster. The result: Many startup CEOs are one crisis away from a meltdown, even as they're "crushing it 24/7" on the outside.

"All these people can't be crushing it," says Jerry Colonna, adviser to executives from startups like Etsy, Cheezburger, and SoundCloud. "It's bullshit. It's spin."

Colonna is known to his star-studded client list as the "Yoda of Silicon Alley" for providing execs with emotional footing. And after 10 years in the business, he says demand is higher than ever. Last fall Colonna co-launched coaching firm Reboot, which offers support groups, mindfulness training, and $10,000 weekend boot camps. Another company, Venwise, provides its executive customers with a "safe place" for $7,000 a year and up. And venture firms, too, are increasingly facilitating peer groups among portfolio company chiefs.

"ALL THESE PEOPLE CAN'T BE CRUSHING IT. IT'S SPIN." —JERRY COLONNA, THE YODA OF SILICON ALLEY

The approach is a break from the traditional coaching fare of training manuals and mixers. In the Internet era, "if we want information, we can go get it," says Venwise CEO Erik Schreter. Same with networking. What today's CEOs need, he says, is someone who can relate. Once execs see they're not the only ones with profound anxiety, it's a relief. "People come to my office, they sit on my couch, and they cry," Colonna says. His favorite phrase is simple: "Know that you're not alone."

BUYING POWER

THESE THINGS COST MORE THAN ALL LOBBYING SPENDING IN 2014

In the broader context of costs in corporate America, the big money spent to woo Washington lawmakers is pretty small. —TORY NEWMYER

TOTAL SPENT ON LOBBYING	COCA-COLA AD BUDGET	RENOVATIONS TO LAGUARDIA AIRPORT	CONSUMER SPENDING ON HALLOWEEN
$3.2 BILLION	$3.3 BILLION	$3.6 BILLION	$7.4 BILLION

PHOTOS FOR COLLAGE: GETTY IMAGES

Your Cybersecurity IQ:

Know the Threat

THE THREATS WE FACE

$3 trillion
potential global impact of cybercrime[1]

62%
increase in data breaches in 2014[2]

Employees
not firewalls are #1 threat vector

2.5 billion
records exposed in the past 5 years[3]

24/7/365
hackers incentivized to adapt tactics and attack persistently

10,000
global corporations collectively experienced 40+ million security incidents in 2014[4]

Intellectual property
is more valuable than credit cards on the cyber black market

THE GAPS TO FILL

HELP WANTED

1+ million
unfilled cybersecurity jobs worldwide[5]

1 out of 3
security professionals is unfamiliar and inexperienced with advanced persistent cyber threats[6]

83%
of firms lack the skills and human resources to protect their assets[7]

62%
of all organizations have not increased security training in 2014[8]

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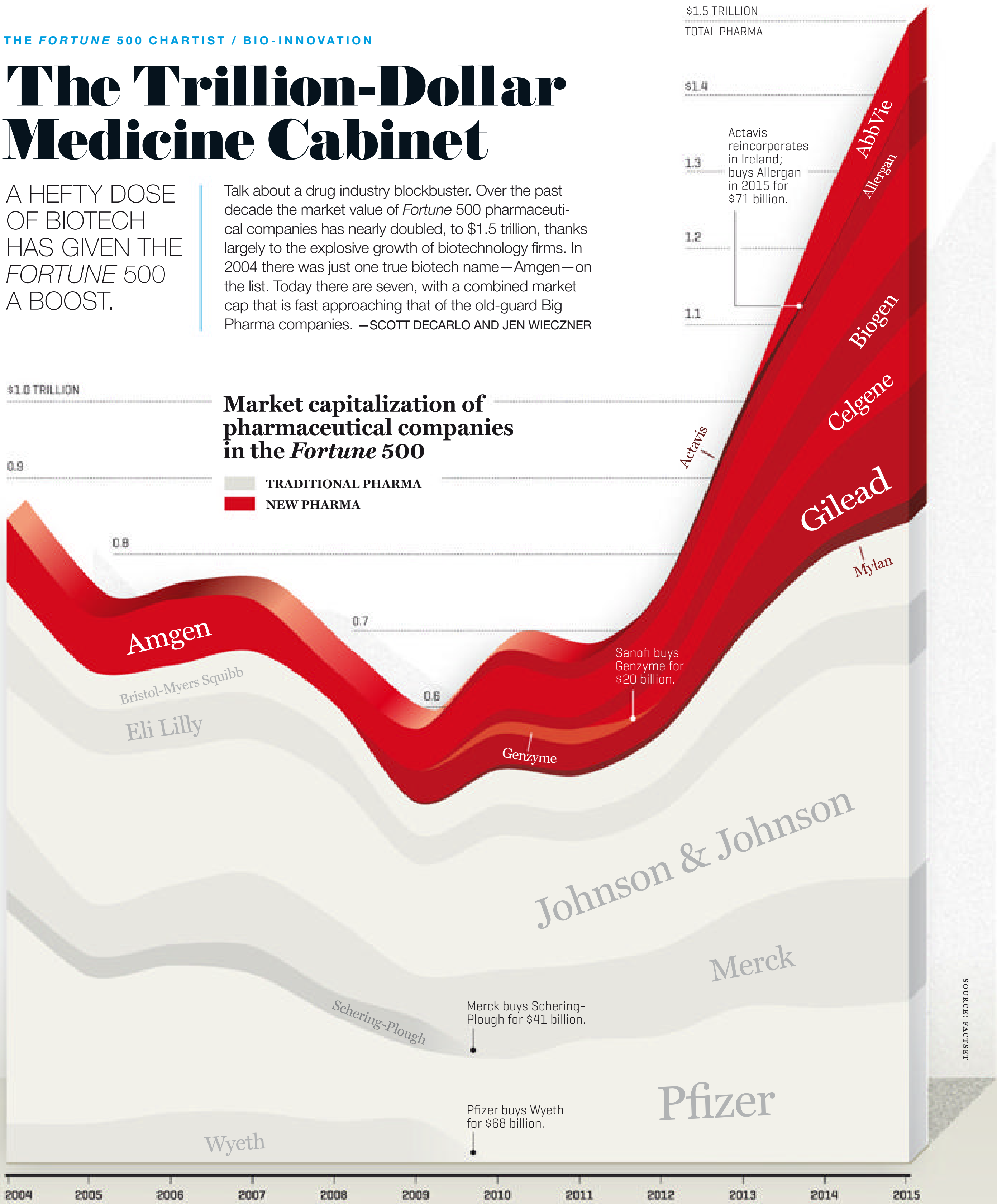
SOURCES: **1.** McKinsey World Economic Forum, 2014 **2.** Teresa Shea, NSA & ECEDHA Conference March 2015 **3.** ISACA Study, 2014 **4.** PwC, 2014, 2014 **5.** Cisco Systems, 2014 **6.** ECEDHA Conference March 2015 **7.** ESG Study, 2015 **8.** ECEDHA Conference March 2015

THE *FORTUNE* 500 CHARTIST / BIO-INNOVATION

The Trillion-Dollar Medicine Cabinet

A HEFTY DOSE OF BIOTECH HAS GIVEN THE *FORTUNE* 500 A BOOST.

Talk about a drug industry blockbuster. Over the past decade the market value of *Fortune* 500 pharmaceutical companies has nearly doubled, to $1.5 trillion, thanks largely to the explosive growth of biotechnology firms. In 2004 there was just one true biotech name—Amgen—on the list. Today there are seven, with a combined market cap that is fast approaching that of the old-guard Big Pharma companies. —SCOTT DECARLO AND JEN WIECZNER



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GRAPHIC BY NICOLAS RAPP


Twenty years from now, you'll probably wish you hadn't said, "Oh, I've still got 20 years to worry about dying from Alzheimer's disease."
Today, more than 5 million Americans are experiencing the personal devastation of Alzheimer's disease. While support is available, tragically, nothing can be done to stop it. So do something little, right now, to help provide better care and find a breakthrough in your lifetime. Because that would be BIG.
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CALENDAR

MAY
10

MOTHER'S DAY OUT

More people dine out on Mother's Day than on any other holiday. Here, the top days for restaurant traffic.

MOTHER'S DAY
80 MILLION

THANKSGIVING
79 MILLION

VALENTINE'S DAY
70 MILLION

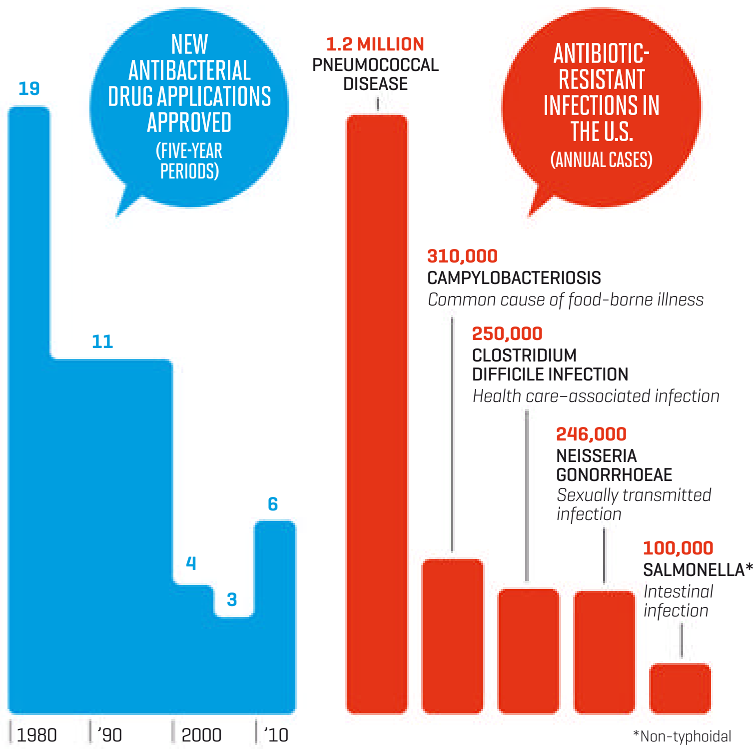
FATHER'S DAY
50 MILLION

EASTER
33 MILLION

AVOIDING DISASTER

WE NEED MORE ANTIBIOTICS

Antibiotics, one of modern medicine's greatest triumphs, are becoming less effective. Every year in the U.S. at least 23,000 deaths and 2 million illnesses are caused by antibiotic-resistant pathogens, costing $20 billion in direct medical expenses. One contributor to the problem is that antibiotics offer weak returns on investment for pharma companies compared with other drug categories—and that hasn't exactly encouraged research. Indeed, scientists haven't discovered a new class of antibiotic since 1987 (though there was a small increase in individual approvals last year). The good news is that there's an effort to address the issue, in Washington, at least. In March, President Obama proposed a $1.2 billion plan to kick-start R&D for antibiotics and reduce overuse (a key to containing the spread of superbugs). —*LAURA LORENZETTI*



TOP TWEET

"ASCENT SUCCESSFUL. DRAGON ENROUTE TO SPACE STATION. ROCKET LANDED ON DRONESHIP, BUT TOO HARD FOR SURVIVAL."

—@elonmusk on the successful launch of SpaceX's Dragon spacecraft to the International Space Station on April 14. However, the booster rocket fell over shortly after touching back down on Earth.

ROCKET: COURTESY OF SPACEX; CHART SOURCES: CENTERS FOR DISEASE CONTROL AND PREVENTION; FOOD AND DRUG ADMINISTRATION

STICKER SHOCK

COLLEGE COSTS ARE LESS THAN ADVERTISED

As newly minted graduates collect their diplomas this year, many will have spent more for their degrees than anyone in American history. But not all students pay through the nose to get a sheepskin. While the nominal price of tuition has soared over the past two decades (up 111% since 1995 for public schools), the actual price most people pay has crept up only 50%—and just 17% for private schools, according to the College Board. That's because government aid and scholarships have kept the net costs lower than the ones that schools advertise to prospective recruits. But the sticker prices still have a chilling effect: They can deter less affluent students from applying at all. —*SCOTT OLSTER*

2016 Mercedes-AMG GT S shown in Solar Beam Yellow metallic paint with optional equipment. ©2015 Mercedes-Benz USA, LLC

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The party ain't what it used to be.

BRIEFING

INITIAL PUBLIC AWFULING

The IPO used to be a moment of glory. Now it's a sign of desperation.

By Stephen Gandel

IN EARLY MARCH executives of MaxPoint Interactive grinned triumphantly as they rang the bell of the New York Stock Exchange. It was the morning of their initial public offering. Shares of the digital marketing firm, one of the few tech companies to go public in 2015, promptly plunged.

IPOs have often been a mixed bag. And there have always been some duds. But historically the companies that go public have been up-and-comers. This year's crop seems like a mixture of has-beens, misfits, and never-weres. GoDaddy, the biggest tech company to IPO in 2015 so far, is years past its buzzy Super Bowl ad prime and still doesn't make money. Several recent biotech debuts are years away from a breakthrough drug. And execs at crafting website Etsy say the company is not about profits.

> "IF YOU GO PUBLIC IN THIS ENVIRONMENT ... GOD HELP YOU."
> —MARC ANDREESSEN

Of the 37 companies that went public in the first quarter of the year, just 10 were profitable. That's down from 43% in 2013. Back then, the average company that went public had sales growth of 50% over the prior year. These days it's about half that.

"There had been generally smaller and riskier IPOs earlier in the year," says Frank Maturo, a vice chairman at UBS, though he added that April saw an uptick in quality deals. "Some tech companies are deciding they'd rather stay private longer."

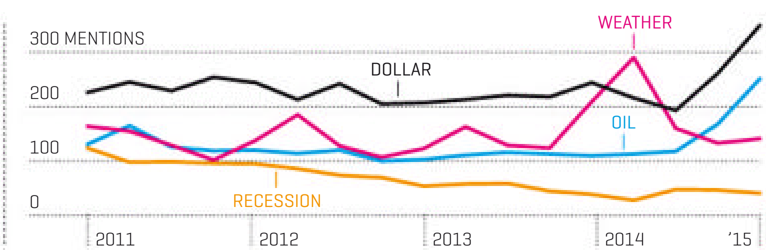
Facebook can take some of the credit. The social media giant's 2012 dud of a launch has become a cautionary tale. Then, in 2013, the Jobs Act made it easier to raise money as a private company. Tech startups raised $9 billion privately in the first quarter, or 13 times the $710 million raised through public offerings, according to Triton Research. The companies that aren't hurting for investors, like Uber and Airbnb, have so far opted out of the public markets and the headaches that come with them. Influential venture capitalist Marc Andreessen says that's a sound strategy. "If you go public in this environment, with no protection, God help you," he told attendees at a *Fortune* Brainstorm Tech dinner in April.

Twenty years ago this summer, Netscape, where Andreessen worked, went public, igniting the era of the IPO. A public offering meant you had arrived. Now it feels like desperation. In mid-April, Shopify, a Canadian marketer of software for retail websites, announced it was going public. The company has lost nearly $35 million since it was founded, and it says profits aren't likely to come anytime soon. Welcome to the IPO market, Shopify. You'll fit right in.

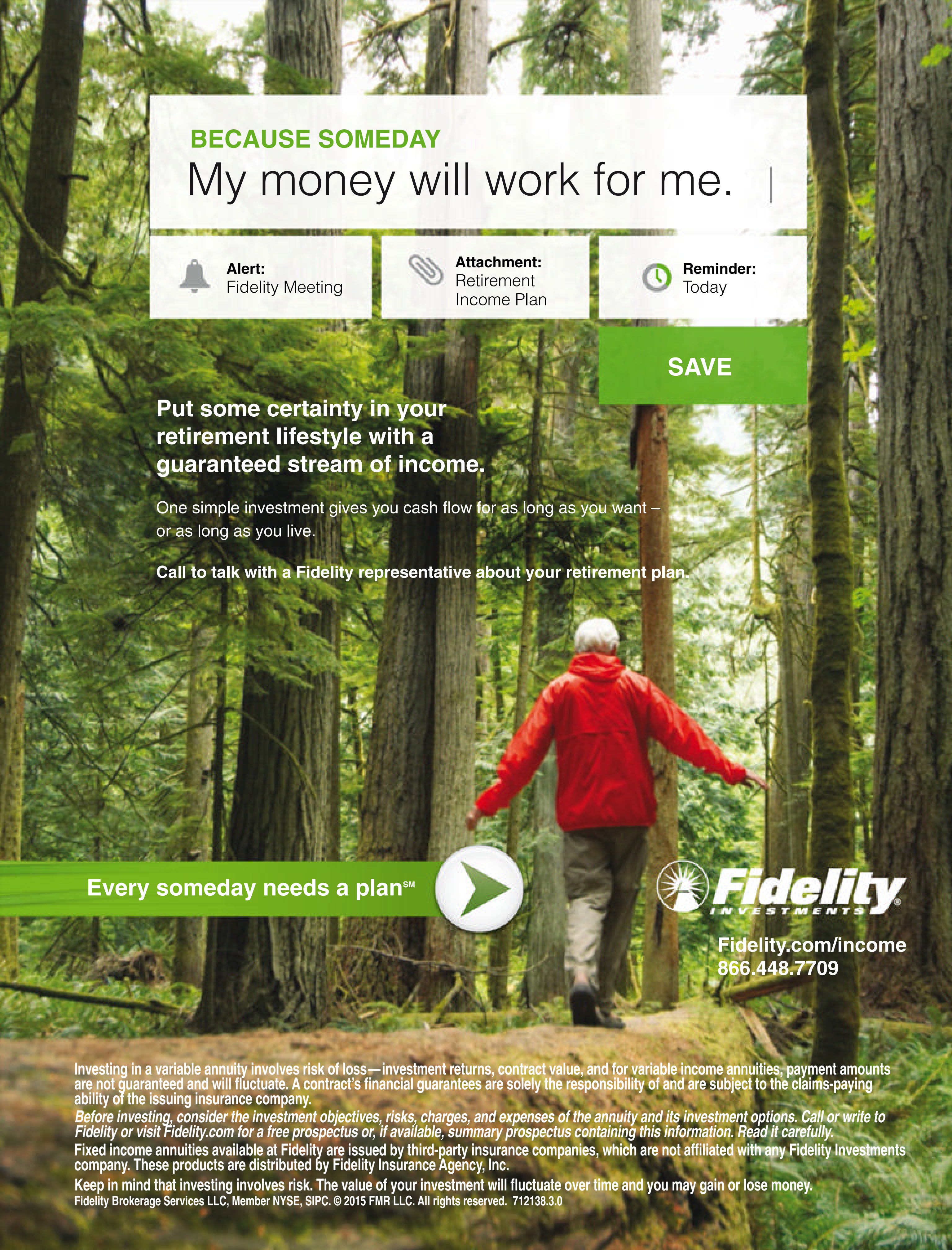
TREND WATCH

THE WEATHER ATE MY RETURNS

The strong dollar, cheap oil, a recovering economy: all stories with a big impact on business. How big? We asked FactSet to tally how many S&P 500 companies cited those trends in earnings calls. In case you forgot, business really, really hated last year's cold snap. —*JEN WIECZNER*



ETSY: MICHAEL NAGLE—GETTY IMAGES; CHART SOURCE: FACTSET


BECAUSE SOMEDAY
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Attachment:
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Income Plan
Reminder:
Today
SAVE
Put some certainty in your retirement lifestyle with a guaranteed stream of income.
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WORLD'S MOST ADMIRED COMPANIES

Betting Big on Health

IN ITS BID TO BE A ONE-STOP MEDICAL RESOURCE, **CVS HEALTH** HAS BECOME THE NATION'S LARGEST OPERATOR OF RETAIL CLINICS. *By Laura Lorenzetti*

HEALTH ISN'T JUST AN IDEAL for CVS Health—it's the very core of its business (and new name). Not only did the retailer sacrifice $2 billion in sales after nixing tobacco products from stores, but the company also said it would give $5 million to nonprofits to increase access to health care across the U.S. Nearly half of that sum was doled out in April to 55 recipients, who will use the funds to support free clinics and community health centers.

As the company pivots toward full-service health care, its goal is to increase access, lower costs, and improve outcomes for patients. It is also working with employers as a pharmacy-benefits manager and treats patients at the community level with its 980 MinuteClinic locations—the largest clinic network in the U.S. Soon the clinics will also offer everyday care for chronic conditions like diabetes and high blood pressure.

"We can triage care in terms of working with health care partners to make sure our customers are getting the right level of care at the right time," CVS Health CEO Larry Merlo tells *Fortune*.

While critics fear the nurse-practitioner-staffed clinics lack the quality of a traditional doctor's office, CVS Health has responded by establishing relationships with local physicians and hospitals like Cleveland Clinic to ensure that patients get the right level of care, which ultimately saves the patient—and the system—money.

COMPANY SNAPSHOT

Headquarters
Woonsocket, R.I.

Employees
137,800

Revenues
$139 billion

Business
Drug and food retailer, with more than 7,600 locations in the U.S.

PEGGY PEATTIE/U-T SAN DIEGO/ZUMAPRESS

STUBBING OUT CIGARETTES

CVS Health announced in early 2014 that it would stop selling all tobacco products, sweeping them off the shelves officially in September. "The contradiction of selling tobacco and delivering health care within the same four walls was growing for us," says Merlo. "We saw it as a barrier to future growth." Many analysts worried that the move would heavily dampen front-of-store sales, but after the first full quarter, the impact has been minimal. The decision "gives them a lot of credibility," says Steven Halper, an analyst with FBR Capital Markets. "And it helps get them an audience when talking about health services."

MANAGING HIGH DRUG COSTS

CVS operates the second-largest pharmacy-benefits manager. The unit handles employers' drug programs by processing and paying prescription claims. Last year CVS Caremark, its PBM unit, processed 932 million of the 4.3 billion prescriptions filled in the U.S., netting the company $88.4 billion. Part of CVS Caremark's role is to help manage drug costs and provide the lowest possible price for plan sponsors, says Merlo. The company showed its negotiating prowess in recent months as it pressured Amgen, Pfizer, and Sanofi to lower the cost of new injectable cholesterol treatments.

EVERYDAY CARE AND BEYOND

"They've had a very differentiated strategy by using their massive store presence to change health care at the community level," says Ross Muken, an analyst with Evercore ISI. More than 2,700 nurse-practitioners and physician assistants have cared for 25 million patients through CVS's MinuteClinics, making it the U.S.'s largest retail clinic. The network of on-site clinics also gives CVS a platform to expand its medical offerings. "Advancements in diagnostics and technology are changing how that service is provided," says Merlo. "I can see us adding and broadening our scope of services as more technology becomes available."

45 DEBUT RANK OF CVS HEALTH ON THIS YEAR'S LIST OF THE WORLD'S MOST ADMIRED TOP 50 ALL-STARS

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L.L. Bean's factory in Brunswick, Maine, produces 1,300 pairs of boots every day.

GREAT WORKPLACES

OUTDOOR ADVENTURES ON THE JOB

In March, retailer L.L. Bean returned to *Fortune*'s 100 Best Companies list for the first time in 16 years. Here's why. ***By Claire Zillman***

MAINE-BASED OUTDOOR GOODS RETAILER L.L. Bean last appeared on *Fortune*'s annual list of great workplaces in 1999 at No. 100. Since then, the company has grown—headcount rose 22% to 4,966 employees, many working at its 26 stores and 10 outlets—and it has added many perks and benefits programs, including free on-site health screenings, fitness classes, and on-site massages. Now headed by the fourth generation of the Gorman family, L.L. Bean celebrated its 100th anniversary in 2012 and committed to keep its pension plan—one of few retailers to still have one. And just last year the company increased its tuition reimbursement from $2,750 to $5,250 per year. All of these added programs have inspired employees to rave—resulting in a return to the list at No. 56.

By far the most singular and popular perk at the retailer is its paid workdays dedicated to enjoying the outdoors.

On a sunny afternoon in March, Katie Livesay and 69 of her co-workers from L.L. Bean's corporate marketing and e-commerce group went on a field trip. They drove two miles from the company's headquarters in Maine to Fogg Farm, a 700-acre plot of wooded land with a nine-hole golf course that the company has owned for decades. They enjoyed a day of cross-country skiing and snowshoeing along three miles of landscaped trails. "Day to day, you're just so intent on working," says Livesay, an online marketing manager. "This was a great opportunity to get to know new people outside of a work setting."

Depending on years of service, salaried employees receive three to five days per year—on top of 10 to 15 days of vacation—that are designated for outdoor activities with colleagues.

Emily Carville, director of online marketing, spent one of them learning to roll a kayak and used another to kayak with a colleague near the islands in Maine's Casco Bay. She has also traveled with colleagues to Rangeley Lake, 95 miles north of Freeport, where the company owns seven cabins. Carville, who moved from Boston to work for L.L. Bean a decade ago, says the outdoor days "are meant to be about team building."

The benefit also allows staff to work with the products that they're selling. Employees are welcome to borrow or rent gear and equipment, including tents, cross-country skis, and kayaks, from the headquarters "use room." The more employees experience L.L. Bean's products in real-world settings, the better they are at explaining them to consumers, says Marie McCarthy, VP of human resources. When employees explore the outdoors, she says, "it gives them a chance to live what we want to impart on customers."

That philosophy started with founder Leon Leonwood Bean, whose emphasis on valuing employees as well as customers still informs the company, much like its 100% satisfaction guarantee. "You are what you say you are, and when you follow up with a guarantee, there's a genuineness to it," McCarthy says.

100 BEST COMPANIES TO WORK FOR

No. 56

Headquarters
Freeport, Maine

Revenues
$1.6 billion

Perk
Employees can receive discounts of 33% to 40% off company-made items.

SCOTT EISEN—GETTY IMAGES

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EXECUTIVE READ

Publishing Discovers the Age of Disruption

THESE BOOKS LOOK AT THE BRAVE NEW WORLD OF RAPID CHANGE.

By Anne VanderMey

This season, as more billion-dollar businesses pop up seemingly overnight and more old-economy fortunes fade into irrelevance, a host of upcoming titles are dedicated to depicting the landscape that disruptive innovation hath wrought. Here, some predictions from the hottest releases about what to expect next.

PHOTOGRAPH BY MICHAEL CHINI

CHINA'S DISRUPTORS

JULY 14, 2015

By Edward Tse

For years, state-sponsored development was the driving force behind an emerging China. But Tse argues that it's the country's 12 million privately owned firms (four times the number a decade ago) that will ultimately change how the world does business. Entrepreneurs like Alibaba's Jack Ma, Tencent's Pony Ma, and Xiaomi's Lei Jun represent the first in a coming wave of internationally influential private-sector companies that will drive innovation, shift the order of world politics, and lead global markets.

RISE OF THE ROBOTS: TECHNOLOGY AND THE THREAT OF A JOBLESS FUTURE

MAY 5, 2015

By Martin Ford

Think you're too creative to be replaced by a machine? Probably not, says Ford, who warns that artificial intelligence is supplanting humans even in routine-resistant professions like journalism, music, research, and more. In the coming age of robots, Ford's ideal outcome would be a world where people earn a guaranteed wage and machines do all the work. The alternative, he says, is inequality on steroids.

ELON MUSK: TESLA, SPACEX, AND THE QUEST FOR A FANTASTIC FUTURE

MAY 19, 2015

By Ashlee Vance

In his roles as CEO of Tesla and chair of SolarCity, arguably no one else has moved the needle on green technology as much as Musk—or made as much money doing it. But those projects are secondary to the undertaking that Vance says is Musk's main focus and most remarkable achievement: SpaceX. The spaceflight company is working on a rocket Musk thinks will land on Mars by 2026. Vance believes it could happen.

COAL WARS: THE FUTURE OF ENERGY AND THE FATE OF THE PLANET

APRIL 14, 2015

By Richard Martin

The "end of coal" is now a foregone conclusion, Martin says. With increasing government regulation and the sinking cost of other fuels, the question is no longer *if* coal-fired plants will be phased out, but *when*. The stakes are high: Coal accounts for 44% of global carbon dioxide emissions and is wreaking environmental havoc. If consumption isn't dramatically reduced within the next couple of decades, Martin writes, it could be "game over" for the climate.

NO ORDINARY DISRUPTION: THE FOUR GLOBAL FORCES BREAKING ALL THE TRENDS

MAY 12, 2015

By Richard Dobbs, James Manyika, and Jonathan Woetzel

In this book, directors at the McKinsey Global Institute pinpoint four major shifts they believe will change the way the world economy works: the aging global population, rapidly emerging markets, the freer flow of world trade and migration, and the breakneck pace of technology. The authors also look to advances in 3-D printing, energy storage, and autonomous vehicles to upend the existing business order.


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GLOBAL POWER PROFILE

HOW FORD'S CHIEF BECAME A TECH CEO

Mark Fields says the car is evolving from the "ultimate industrial product" into the "ultimate technology product"—which means facing a whole new class of competition. *By Andrew Nusca*

MARK FIELDS swishes around the ice in his highball glass as a journalist fires off a litany of pointed questions. The reporter wants to know: What does the leader of the second-largest automaker in the U.S. think about driverless vehicles? And what about mobile devices? And how about car-sharing services? Oh, and could he expand on the implications of urbanization for the American auto industry?

Requests for technological prophecies have become quotidian events for the 54-year-old leader of Ford Motor. As the CEO of a 112-year-old industrial giant, the Diviner of Dearborn is getting used to parrying questions from gaggles of tech reporters—like the ones gathered here at New York City's opulent Peninsula hotel—rather than from the auto press. As Ford makes the transition to a "mobility company," Fields answers his inquisitor, "we have to challenge ourselves." He mentions the Parking Spotter app the company is testing. In the past Ford executives might have said, "'Doing experiments to find parking spaces? That's not our business,'" Fields says. "Well, maybe it should be."

Fields was in New York to officially unveil the ultra-luxe Lincoln Continental concept car at the New York International Auto Show and quietly mark the nine-month anniversary of his taking the top job at Ford.

For Fields, Ford's new CEO, the role of tech evangelist is part of the job description.

TOM STOCKILL—REDUX

His predecessor, Alan Mulally, spent eight years turning around a company that had become dysfunctional and depleted. Fields' mission is not only to continue that momentum but to meet the digital demands of drivers in an industry that's growing more crowded by the day, with low-cost foreign automakers, upstarts like Tesla, and even tech companies like Uber and Google. "I originally joined the auto industry because it was the ultimate industrial product and the ultimate consumer product," Fields recalls. "Now the car has become the ultimate technology product."

A Ford lifer, he has some of the boyish charm of his predecessor. But Fields, raised in northern New Jersey, is far more direct than Mulally, a Kansan 15 years his senior. As one reporter presses him about the rapid rise of Uber, the on-demand car service, he interjects, "There's too much broad-brushing about car sharing and Uber taking over the world." Says Fields: "When you reach a certain life stage—you get kids—you're not going to walk out of your place and schlep around your two Graco car seats to get the car-sharing service."

While Fields may crack jokes at Uber's expense, he's still aggressively rolling out new technology at Ford. The company recently opened a Silicon Valley research center, and it launched a record number of new products last year, including an overhaul of the country's bestselling vehicle, the F-Series pickup truck, and a major revision to its telematics system, Sync. Ford's 2014 profit was $3.19 billion, half of what it was the year before, but Fields says that's due in part to spending on innovation that will put the company on track for a stronger 2015.

Such confidence notwithstanding, Fields does envy one thing about the Teslas of the world: their startup mentality. "We want people to challenge custom and question tradition. We want them to not take anything for granted," Fields says of his employees. "When you're a 100-year-old company, you take things for granted."

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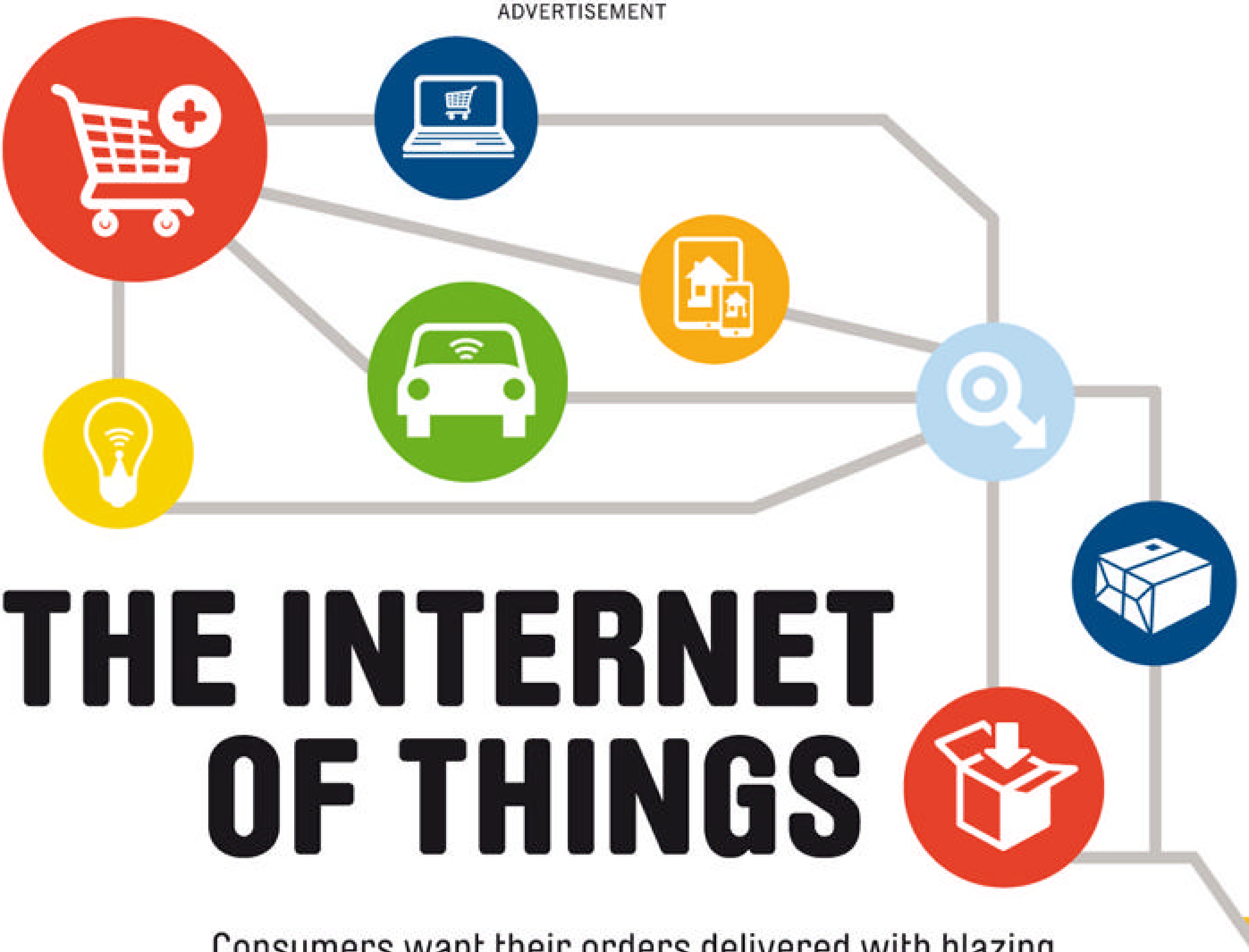

THE INTERNET OF THINGS

Consumers want their orders delivered with blazing speed. It's the wave of the future—and the road to profits.

THE IDEA IS EVERY CONSUMER'S FANTASY. You place an order for something online—shoes, say—and a few minutes later they show up on your doorstep, at your office, or even at the airport on your way out of town.

Most likely, a courier drops them off, but perhaps it'll be a sleek, six-bladed autonomous drone, which sends you a text to tell you that in three minutes it will swing by with your shoes.

The point is, you have your order—fast. You can avoid a trip to the mall, focus on your work, or play in the yard with the kids, who no doubt will enjoy the arrival of the cargo-laden copter as much as you will. This is the world we're quickly approaching. It's a world that supply chain leader Dematic has made a reality for blue-chip companies around the world, and, by extension, consumers. In an age where gratification is instant and technology evolves at breakneck speed, it's inevitable.

You could say we're a culture of impatient consumers armed with smartphones. Or you could say that this is a sensational new reality—the Internet of Things—in which the once-convoluted, protracted process of bringing people and products together has been honed to an efficient, connected, and hyper-responsive science. That's how any company that truly wants to succeed in retail should view it. Dematic has helped retailers across the globe adapt to consumer buying behavior and evolve the Internet of Things to accommodate demand.

The Atlanta-based group sees vast opportunity for innovation at the intersection of virtual and reality—but only for those willing to embrace potentially radical change. "The Internet enables things to come together, but evolving consumer demand has shifted the power over this exchange away from the manufacturer," says Dematic Global President and CEO Ulf Henriksson. "If you cannot deliver a prod-

uct immediately, consumers will simply move on to the next seller—the one who can. This is the next revolution in the customer supply chain. Retailers now face new competition, driven by the consumer, and companies must respond to it."

This transformation toward the Internet of Things, Henriksson argues, can be traced to urbanization, which instills an expectation of close proximity and immediate accessibility among buyers. It's irrefutably changing the retail landscape. "When they place orders on a website or from their phone, consumers want something to immediately grab the physical product and send it on its way," says Henriksson. "In reality, however, the order trickles a long way down before a product finally starts to move. Dematic designs supply chain solutions that are responsive and expedite fulfillment of orders, enabling companies to keep pace with heightened consumer expectations."

Dematic approaches each challenge with a combination of software and infrastructure improvements. It begins with a conversation with the customer about the scope of change required to create a truly responsive system: Where are the products, how will they be distributed, what are the bottlenecks and challenges? Alterations—or complete restructuring—of the physical supply chain may be required, and a key part of the evolution will be giving personnel at every stage of the process the power to make decisions that optimize the movement of products through the supply chain.

Real-time data, analytics, and dashboards delivered by Dematic proprietary software is game-changing. Henriksson has recruited top talent from leading technology companies to develop software that provides customers with the ability to compress the time from receipt of order to delivery of product. "They've connected the order to the physical good and move it quickly," he says.

That means, among other things, shifting to a "pull system" instead of a "push system"—extracting the product based on immediate, actual demand from carefully chosen points, rather than a process that simply pushes inventory out based on forecasted demand. "If companies can expand their inventory to include many more local distribution centers, retail stores, or even use delivery trucks as sources of goods, the transit time will progressively reduce to hours and minutes, not days," says Jim Stollberg, Dematic's EVP of research and development.

As the Internet of Things evolves, more new methods of distribution will develop. Henriksson sees companies fine-tuning their support for customers who order the same items frequently, so they arrive just as needed and in the perfect quantities. Companies will also evolve a more active and engaged interaction with social and recreational shoppers—the ones buying black dresses for weekend getaways or the perfect wine for dinner.

We're already deep into the era of instant downloads and mobile shopping, and are entering the era of on-demand 3D printing, which will increase expectations still further. When consumers can literally create a product on their kitchen counter, you see how quickly the bar is being reset. Only retailers with supply chains that are able to respond with speed and accuracy will succeed. Now, more than ever, the first to deliver wins.

DEMATIC

The Internet is about information. The physical network is about goods. The Internet of Things bridges the two and is empowered by supply chain solutions designed by Dematic. The company helps retailers around the globe optimize their supply chains to quickly respond to the growing demands of consumers.

For more information, visit www.dematic.com/IOT

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Venture

THINKING SMALL

STARTUPS ... INSIDE GIANT COMPANIES

Innovation belongs to the small and nimble, right? That's what GE, IBM, Coke, and others think. They're launching "startups" inside their walls, seeking the elixir of creativity.

Phillip Honovich in the New York City offices of MasterCard Labs

By Jennifer Alsever

PHILLIP HONOVICH SPENDS HIS DAYS like any worker at a startup. He tests software, hustles for clients, and collaborates with a nine-person team inside a sleek open-plan office in the tech sector of New York City. Failing fast is encouraged.

But Honovich doesn't work for a startup. He's one of 10,000 people employed by MasterCard, which has $9.5 billion in annual revenues. Honovich, 25, planned to work for a young outfit or found his own company after graduation from Manhat-

PHOTOGRAPH BY **STEPHANIE DIANI**

tanville College three years ago. Instead, 50-year-old MasterCard lured him to help build a platform called ShopThis, which lets people buy products directly from a digital magazine page without leaving the page. It's one of dozens of mini-companies inside MasterCard Labs' three-floor New York City office, which opened in September. "It feels just like a startup," Honovich says.

That's the idea. In the past two years giant corporations such as Coca-Cola, MetLife, General Electric, IBM, Mondelez International, Cisco, and Tyco International have started taking cues from the startup and venture capital world. (A few others, including MasterCard and American Express, launched such programs in 2011.) They're holding innovation contests and using panels of executives to dole out investment dollars to fund internal startup ideas.

Unlike special skunkworks projects of the past, intended to hive off a single project into its own unit, these efforts are intended not only to nurture profitable new entities, but also to infuse entrepreneurism into venerable operations filled with layers of middle managers.

Hatching in-house startups is "the new way of working that eventually every large company will embrace." *—David Butler, VP of innovation at Coca-Cola*

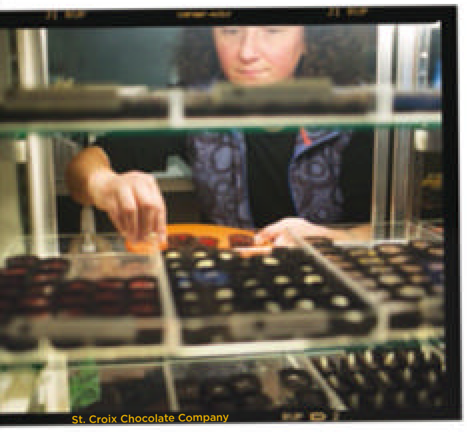
It's too early to tell whether the approach is working. Most of the efforts are nascent, the baby enterprises mere months old or not yet born. Optimists would say this will allow some decades-old enterprises to sip from a fountain of youth. A pessimist might worry that it'll be the corporate equivalent of middle-aged parents donning tight clothing and awkwardly twerking to demonstrate to their horrified teenagers that they're keeping up with the times.

For now, the Silicon Valley mind-set is in. GE has enlisted 500 coaches to train executives to embrace concepts like risk taking and learning from failure. Mondelez sends its brand managers to work inside partnering startups to learn how they operate, while Tyco, the fire and security giant, invites venture capitalists to speak on behaving like a startup. "It's the new way of working that eventually every large company will embrace," says David Butler, Coca-Cola's vice president of innovation.

Beyond becoming more agile, the companies want to discover the entrepreneurs already in their ranks and lure new ones. At least 90% of millennials say they would rather work at a startup than a corporate giant, according to James Canton, a futurist and author of *Future Smart: Managing Game-Changing Trends That Will Shape the World.* "There is a fierce war for talent," he says, "and a startup has a feeling of newness."

It's not that big companies don't get what startups do, says Coca-Cola's Butler. It's just that replicating the unstructured, unfettered moves of, say, a five-person outfit is difficult to do with

COMPANY/ PROGRAM	General Electric FastWorks	Tyco Growth and Innovation System	Coca-Cola Lean Startup	Mondelez Mobile Futures
LAUNCHED	2013	2013	2013	2013
EMPLOYEES INVOLVED	3,500 (out of 300,000 at GE); goal of 35,000 by year-end	200 (out of 57,000)	1,000 (out of 129,000)	25 (out of 100,000)
HIGHLIGHTS	500 projects; 500 coaches focused on teaching employees and executives entrepreneurial principles; dozens of "growth boards" consisting of four to five top execs who hear pitches, award funding, and give the go-ahead for a team to test ideas in a 90-day sprint.	Innovation workshops; an internal venture capital group that doles out investment money for new ideas.	Idea-pitch parties; "failure conferences," where people describe their biggest mistakes; workshops to create fast concept prototypes of a new idea with the least amount of cash.	Three-month accelerator programs in Australia, Brazil, and the U.S. to nurture and mentor nine outside startups. To shift its own culture, Mondelez sends brand managers to work inside those startups for a week.
RESULTS TO DATE	Dozens of funded internal startups. The company says it has improved product efficiency, job satisfaction, and the ability to attract and retain millennials.	Creation of 20 internal startups, one of which developed a new remote fire-alarm-testing product in a year and was able to double flame- and gas-detection revenue by speeding up processes.	Investments in 11 outside startups that aim to solve Coca-Cola's internal challenges.	The company co-created two startups, Betabox (since sold) and Prankstr. An internal survey shows 75% of Mondelez employees believe it should think more like a startup, up from 35% the year before.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SMALL BUSINESS REVOLUTION

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the systems and vast teams needed to operate on a global scale. "Big companies tend to hire managers, not explorers," Butler says. "You tell them to do this and keep doing it, not explore new ways to do it. Early-stage companies employ nothing but explorers."

A former entrepreneur who co-authored *Designed to Grow: How Coca-Cola Learned to Combine Scale & Agility*, Butler has led a company-wide effort to teach managers how to become explorers. They imbibe the principle of collaboration. They create one-page business plans instead of lengthy PowerPoint presentations. They develop minimalist product prototypes quickly and cheaply to test their assumptions. They give two-minute spiels at "pitch parties," and attend "failure conferences." (Like GE, Coke has embraced the hottest management vogue in Silicon Valley today: a near veneration of failure and the lessons that can be drawn from it.)

The $46 billion beverage company is teaming with outside entrepreneurs to develop ideas that can solve problems at the company. One example: Wonolo, an Uber for temporary workers who can, for example, restock Coca-Cola brands at stores on demand. "It's a billion-dollar challenge for us," says Butler.

A similar movement is underway at General Electric. A company famous for abiding by strict Six Sigma quality standards and forced performance ranking is de-emphasizing the former and going so far as to test the notion of eliminating those rankings. The goal, it seems, is not to let measuring effectiveness become so all-consuming that it impedes effectiveness. (For more on GE, see Anatomy of a Trade in this issue.)

Today's GE leaders preach the ethos of FastWorks, says Viv Goldstein, its global director of innovation acceleration. That means executives are trained to take risks, learn constantly, and ask questions. Annual reviews have been replaced by continuous daily

Wonolo founders Yong Kim, left, and A.J. Brustein

COURTESY OF COCA-COLA

check-ins and updates. "It's an entire organizational change," says Goldstein.

To look more like a startup, the $149 billion company is knocking down walls at its Fairfield, Conn., headquarters and creating collaborative open workspaces. Even CEO Jeffrey Immelt turned his dining room into what the company calls an innovation hangout, with Ikea couches and high-top tables, and whiteboards. "It's about giving people the environment to think in a different way and getting people to take risks," says Goldstein. "I can say this is the most unbelievable experience, and I've been with GE for 20 years."

"It's about giving people the environment to think in a different way and to take risks."
—Viv Goldstein, global director of innovation acceleration at GE

In just 15 months GE has funded 500 projects proposed by employees to "growth boards," groups of top executives who hear pitches, award funding, and give the go-ahead for a team to develop and test ideas in a 90-day sprint. If a project flops, she says, managers learn and change course.

One GE project is a 31-person startup seeking to commercialize a cheaper, cleaner form of solid oxide fuel cells, which convert natural gas into electricity. It was proposed by GE research leader Johanna Wellington, who has her own board of directors, funding milestones, and full decision-making power. "We have the same agility of a startup," she says, "and it could have a huge impact on the bottom line long-term."

At MasterCard, which has held countless innovation contests and workshops on agility in recent years, the efforts have yielded tens of thousands of ideas and dozens of mini-startups, including ShopThis and a smartphone app for Whirlpool that lets people pay for and monitor their laundry remotely at laundromats. MasterCard has also boosted millennial hires: Those young workers now constitute 38% of its employees, up from 10% in 2010.

A crucial missing piece of these programs is equity. Ownership and the possibility of striking it rich are central in the startup realm. Large companies are still trying to figure out how to give incentives to salaried employees.

Cisco Systems successfully built three companies using a "spin in" model, which includes developing the idea, infusing the startup with cash, and sending it out on its own—with the option to buy it back in the future. But the model elicited gripes among nonparticipating Cisco employees, who don't get the same opportunities to cash in. For its part, MasterCard gives $250,000 prizes to the teams that come up with the best idea in its innovation contest.

Garry Lyons, MasterCard's chief innovation officer, acknowledges the tradeoff for corporate entrepreneurs. Yet he says they have a better shot at success and far less financial and personal risk. Companies like MasterCard can offer the infrastructure, manpower, finances, and brand cachet to open doors. "It's more than financial incentives," he says. "It's the motivation to do something interesting and get access to brand credibility and our network. It's like their own business inside our walls."

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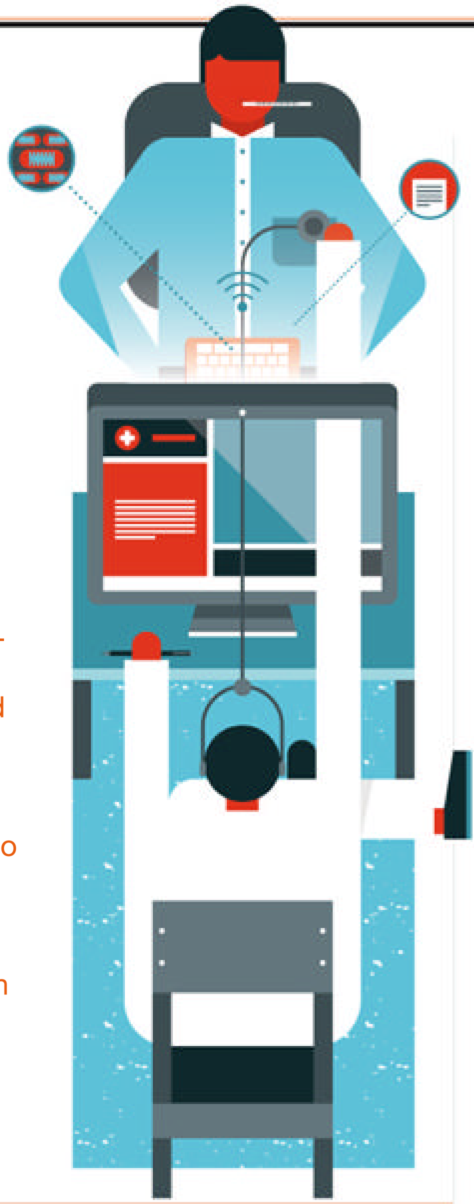

On-the-Road Care

By Jennifer Alsever

It's a scenario dreaded by business travelers: Recently Tristen O'Brien lay in bed inside a Chicago hotel room, feverish and racked with chills. It was 11 p.m., and he had a key meeting for his Indianapolis consulting company, the eBay Entrepreneur, the next morning. O'Brien decided to find a doctor and logged on to HealthTap .com. Within five minutes he was connected via video to a physician, who diagnosed O'Brien's flu from the kitchen in her home. She called in a prescription for Tamiflu to a pharmacy near his hotel, and O'Brien was sick for just three days rather than nine. Today medical options abound for those on the go, as this primer shows.

VIRTUAL DOCTORS

HealthTap, the service used by O'Brien, began as a question-and-answer site but recently unveiled a telemedicine subscription service for unlimited 24/7 virtual visits with primary doctors for $99 a month (or $44 for a single appointment with a specialist). Users can share photos and test results, ask questions, get prescriptions, and do a voice, video, or text-messaging conference on the site. HealthTap has a network of 67,000 physicians.

Other providers also offer virtual appointments but typically require employers to pay a monthly fee ($1 to $2 per worker), along with charges for each consultation. MDlive has a new smartphone app that lets you connect with a board-certified doctor for $49 each time, while MeMD puts you in contact with a physician 24 hours a day for $49.95 per session.

HOUSE CALLS

A new service called Pager aims to be the Uber for medical care. Started by an early Uber engineer, the smartphone app will send a doctor within two hours to any location in New York City. The cost: $49 for the first visit and $199 for subsequent appointments. Pager plans to expand to the West Coast this year.

Other companies offer house calls in select locations. Inn House Doctor, for instance, will send a doctor to you in 20 cities, including Boston, Philadelphia, Baltimore, Los Angeles, San Francisco, and Seattle. The visits cost $400 and up. My Home Doctor also has a network in Florida that will come to you for about the same price.

URGENT-CARE CLINICS

CVS/pharmacy recently unveiled a smartphone app that displays nearby locations of 970 MinuteClinics across the country. Nurse practitioners see walk-in patients there for minor problems, such as ear infections and pinkeye. The cost is $79 to $99 or a co-pay with most health insurance. Walgreen, too, has 420 in-store clinics, with prices that start at $79 a visit. Wal-Mart recently started opening primary-care facilities in Georgia, South Carolina, and Texas with $40 appointments.

INTERNATIONAL HELP

Those who fall ill while abroad can tap embassies, consulates, hotel doctors, and online resources for help. The State Department offers a list of doctors and hospitals, as do the International Society of Travel Medicine and Joint Commission International; the latter reviews hospital safety worldwide. A free membership from the International Association for Medical Assistance to Travellers provides access to vetted English-speaking doctors and clinics in 90 countries.

Services such as International SOS, MedEx, and GlobalRescue offer doctors and even an airlift out of a country if necessary. A one-year individual membership at GlobalRescue runs $329 and gets you reports on your destination, local emergency phone numbers, and help from doctors (sent to your hotel) and specialists. On Call International sells an annual individual membership for $225 that replaces lost prescriptions and offers a 24-hour nurse hotline.

Supplemental travel insurance can cover some of those charges. Such a policy typically costs 4% to 6% of the price of your trip. That's not cheap—but it's undoubtedly less than what you'd pay for an emergency evacuation without any of these services.

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PRO-FILES

Tennis Pro Finds a New Way to Serve

DAN GOLDIE HAS ACHIEVED EVEN MORE AS A FINANCIAL ADVISER THAN HE DID ON THE COURT.

By Andrew Lawrence

DAN GOLDIE'S professional tennis career lasted only 5½ years. In that time he won four titles (two in singles and two in doubles), peaked at 27th on the singles ranking, and earned a total of $683,000—or less than one one-thousandth of the money he manages today through his Palo Alto financial services firm.

Even half a decade as a pro was far more than Goldie had envisioned. Growing up in the 1970s in McLean, Va., he had one purpose for tennis: as an escape from a domestic life marked by economic insecurity and fear. "My father was an abusive alcoholic," he says. "I never wanted to go home." For Goldie, now 51, that instability shaped not only an athletic career, but also a vocation as a financial pro that has earned him more acclaim than

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he ever found on the hard court.

Goldie's primary goal was a tennis scholarship; Stanford's elite program topped his childhood wish list, and Goldie trained without ceasing to get there. By age 15, he was the top 18-and-under player in the mid-Atlantic region.

He could have joined his equally talented peers at Florida's Bollettieri academy, a tennis hothouse that produced many of the top-ranked contemporaries Goldie later faced (and lost to) on the pro tour—including Andre Agassi, Boris Becker, and Jim Courier. But Goldie's mother was divorcing his father (who died in 1995), and her income as a bookkeeper couldn't stretch to cover the steep tuition. Goldie stayed home and absorbed a different lesson. "We went from an upper-middle-class family living comfortably to my mother and me living alone, paycheck to paycheck," Goldie recalls. "It caused me to place a high value on financial security."

The fees at Stanford were even steeper, of course. But Goldie's tennis—a serve-and-volley style that suited his 6-foot-2, 175-pound frame—netted him a free ride, and victories followed. As a junior, he took Pac-10 singles and doubles championships and a national singles crown. In 1986 he was named an All-American for a third time and won NCAA singles and team titles.

With that success as a springboard, Goldie immediately turned pro—and regretted the move almost as quickly. Though he could hold his own against top players—at Wimbledon in 1989 he beat Jimmy Connors in a second-round match—Goldie could just as easily lose to lesser lights. At times it seemed that battling his way to the pros had exhausted his inner drive. "I don't think I really loved the game the way the top players did," he says. "I made a mistake, personally, of being too focused on the earnings dimension."

But Goldie's fixation on money took him in fruitful directions. He completed an MBA at the University of California at Berkeley while still on the tennis tour. And he traded on his stature as a pro to network with top financial professionals, "trying to get a feel for what this industry is like."

By 1991, when bad shins made continuing on the pro tour untenable, Goldie was ready to become an insider. Three months after retiring with a 122–117 record, he launched his financial advisory firm. He began with no clients and a minimum buy-in of $50,000. Today his firm manages $700 million in assets for about 250 clients—and the buy-in is $1 million.

At the helm of what's now one of the larger independent practices in California, Goldie, a registered investment adviser, helps clients with retirement planning, college savings, insurance, and, of course, investing. In the last of these, he's closely aligned with Dimensional Fund Advisors. A firm based in Austin, DFA offers a family of mutual funds that rely on quantitative models to spread investors' money across a wide range of assets. Goldie has used DFA funds since early in his career. Their approach is proudly math-wonky—but David Booth, chairman and co-CEO of DFA, tells *Fortune* that Goldie has mastered it, proving that he can "communicate the often complex ideas of academic finance in simple and intuitive ways."

"I get a lot of psychic value from helping people. It is the primary reason I do what I do."

Goldie returns a shot during his victory over Jimmy Connors at Wimbledon in 1989.

GILL ALLEN—AP

A knack for simplicity also shaped the how-to manual for which Goldie is perhaps best known. *The Investment Answer: Learn to Manage Your Money & Protect Your Financial Future* was a labor of love Goldie co-wrote with longtime client and friend Gordon Murray—a veteran bond salesman who died of cancer at age 60 in 2011, two months before the work reached bookstores.

The book's central theme is the folly of trying to beat the market. But after Murray's death, that theme became secondary to the story of a Wall Street insider who found religion about keeping investments simple and honest—thanks to a former tennis ace.

Those narratives helped the book spend a few months on the *New York Times* advice bestseller list. Goldie says the book's ideal reader "isn't interested in numbers or money, but really needs to know this information." Athletes often fit this description: "They've got all these people wanting stuff from them and telling them what to do—that's why there are so many bankrupt former athletes," adds Goldie, whose clients include former touring pros.

This fall Goldie will play competitive tennis for just the second time since his retirement, at a Stanford charity event. His game may be rusty, but he doesn't regret retiring when he did. "I get a lot of psychic value from helping people," he says. "It is the primary reason I do what I do."

THE LIGHTWEIGHT CHAMPION OF THE WORLD

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FROM SMARTPHONES to solar panels, you are rarely more than six feet away from a piece of aluminum. Often referred to as a miracle metal, aluminum is repeatedly chosen over competing materials for innovation: It is lightweight, corrosion resistant, easily formed, durable, and infinitely recyclable. Moreover, aluminum's inherent virtues help decrease carbon emissions, a key benefit in today's world as environmental stewardship and government regulations surge, and world leaders address climate change.

The numbers confirm recognition of aluminum's overall value. Producers shipped more than 25 billion pounds of aluminum in 2014—the most since 2006—and demand for the metal is up 10% in construction and 40% in consumer durables, according to The Aluminum Association, which represents 104 companies in the industry. While growth across all industries is on the rise, light vehicles represent the most important global market, further bolstering the $65 billion industry.

"The aluminum industry is in a period of unprecedented growth," says Heidi Brock, CEO of The Aluminum Association.

Indeed, demand for aluminum in manufacturing is a long-term trend, going back 40 years in the automotive industry. The metal is already the second-most-used material in new car and truck construction with no signs of slowing down. As automakers respond to consumer demands for higher fuel economy, better performance, and reduced emissions without compromising size or capability, manufacturers are increasingly turning to aluminum to deliver on all fronts.

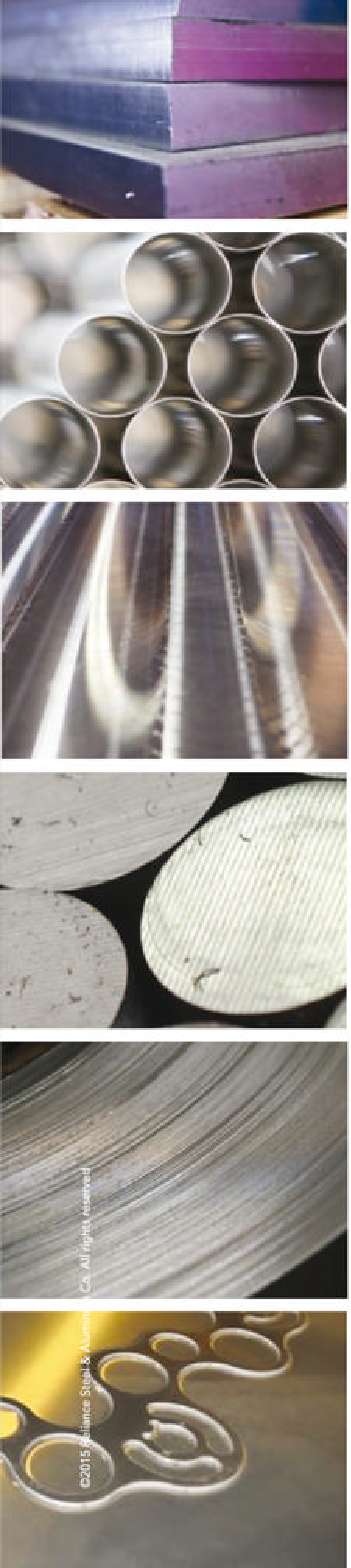
"Aluminum is an essential element on the quest to remain competitive for car makers," says Brock. "The lightweight material allows automakers to save consumers money at the gas pump while also helping them meet future fuel economy and emissions targets."

The Aluminum Association

Renewability is also a key factor in the material's rapid adoption. Because aluminum loses none of its properties when it's recycled, producers are able to tap an endlessly renewable supply.

"It takes just 8% of the energy to make recycled aluminum versus new, or primary, aluminum," says Brock. "When you consider that about 30% of the cost of production for primary aluminum comes from energy inputs, the savings on making recycled aluminum are profound from both an economic and environmental standpoint."

ALL PHOTOS: ALUFOIL.ORG



GLOBAL DEMANDS REQUIRE GLOBAL GROWTH

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In 2013, approximately 70% of U.S. aluminum production involved recycling—a 40% increase since the 1980s. Meanwhile, the emergence of advanced alloys and other technologies has enabled aluminum processors to meet an ever-growing list of custom specifications.

As these factors drive increased demand, companies in several industry verticals are making strategic moves to leverage global assets and capitalize on emerging opportunities.

Take the U.S. automotive industry, where new cars and trucks will need to average 54.5 miles per gallon by 2025. To meet these fuel economy targets, the industry is innovating at a tremendous pace. Leading automakers are pursuing an approach that allows consumers to drive the large cars and trucks they want by switching from heavier steel to high-strength, low-weight, military-grade advanced aluminum alloys. In the next 10 years, according to the 2015 Ducker Worldwide survey of automakers, the number of vehicles with complete aluminum body structures will reach 18% of North American production, from less than 1% today. The study, which surveyed the automakers themselves, suggests that aluminum bodies will mostly appear first in larger vehicles—pickups and full-size SUVs—and then will migrate into the rest of the fleet confirming that by 2025, more than 75% of pickup trucks and 20% of SUVs and large sedans produced in North America will be aluminum-bodied.

To stay ahead of the increasing automotive demand, aluminum producers announced plans to invest $2.3 billion in U.S. plant expansions over the coming decade.

In order to meet growing demand for aluminum auto body sheets in North America, Aleris is investing $350 million in its Lewisport, Ky., facility for metal-finishing capabilities and an innovation center to support automotive projects. The company is already a leading supplier to premium auto manufacturers in Europe from its Duffel, Belgium, site, where it completed a similar expansion last year.

"The real investment barrier to entry is hot mill capacity," says Aleris chairman and CEO Steve Demetriou. "In addition to Europe, we have hot mill capacity in the U.S., which is the site of our next expansion project, and in China. That gives us global flexibility to add finishing equipment to produce for the automotive body sheet that the industry is requiring."

Aleris also sees opportunity for growth in the U.S. building and construction industry, and last year it acquired Nichols Aluminum to strengthen its position as a leading supplier of aluminum for residential building materials.

Others are being aggressive, too. Constellium, a global leader in aluminum advanced alloys, became a leading world supplier to the auto industry in part by catering to European customers, historically. Now the firm's European know-how is bearing new fruit in North America.

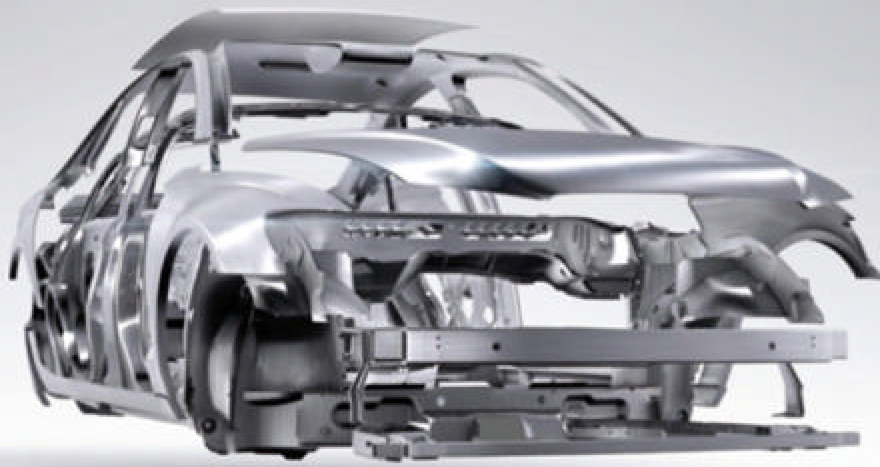
This year, Constellium acquired Alabama-based Wise Metals in a capacity-expanding move. The plan: Invest up to $750 million by 2022 in the newly acquired Muscle Shoals, Ala. plant, which is currently fully focused on the can market, to increase capacity and start producing auto body sheets for the car industry.

"We have renowned innovation capabilities enabling us to offer advanced alloy products that are performing higher than a few years ago," says Constellium CEO Pierre Vareille. "Our customers know how to make the best use of our products. And the economics have progressed because of the CAFE regulations. You have to lightweight your cars."

"It takes just 8% of the energy to make recycled versus new, or primary, aluminum."

—HEIDI BROCK, *CEO, The Aluminum Association*

The Wise acquisition is part of a larger strategy at Constellium, a long-time supplier of aluminum products for the aerospace, automotive, and packaging industries. The company already operates one of the world's largest aluminum rolling mills in Ravenswood,



For Constellium, aluminum is more than a metal.
It is the material that takes the shape of our ideas so our ideas may shape the world. With our expert teams, world-class R&D center and outstanding facilities, we are a global leader in developing and manufacturing innovative and value-added aluminum products for a broad range of markets and applications, including aerospace, automotive and packaging.
Curious, passionate and determined, we are always exploring new boundaries, and together with our partners we can shape a future of infinite possibilities.

Constellium

Ideas. Materialized.

W. Va., mainly dedicated to aerospace and defense. Constellium has started building a new plant in Bowling Green, Ky., and has doubled the capacity of its Van Buren, Mich., facility to serve car manufacturers with auto body sheet and automotive structures, respectively. Each move helps deliver on growing orders from the likes of Ford Motor Co., which uses Constellium structural parts in its new aluminum-bodied F-150 pickup truck.

Aluminum's strength, weight, and recyclability are also making it a material of choice for transportation other than automobiles. Train cars, for instance, are increasingly made from aluminum parts. Storage tanks for transporting liquefied natural gas (LNG) could be made from aluminum; from its plant in Zhenjiang, China, Aleris anticipates supplying material for Asian LNG tank manufacturers.

In aerospace, where safety and weight factors are paramount, manufacturers are increasingly using aluminum in fuselages, wings, and mechanical parts. Aluminum processors are moving aggressively to serve a pent-up market; anyone ordering a commercial airplane these days must wait an average of nine years for delivery.

Leading the charge to meet global demand for aluminum is Los Angeles–based metals service center company Reliance Steel & Aluminum Co. The parent company of more than 35 subsidiaries and 75 brands, Reliance serves various industries and sees exceptional potential in aerospace, according to senior vice president of operations Bill Sales. That's why the 76-year-old firm is leveraging its network of aerospace-focused companies—AMI Metals, All Metal Services, Bralco Metals, Metalweb, Service Steel Aerospace Corp., and Yarde Metals—to supply major airframe builders and defense contractors, including Boeing, Airbus, and their subcontractors.

"We're bullish about aluminum. It allows companies to innovate while driving sustainability."

—HEIDI BROCK, *CEO, The Aluminum Association*

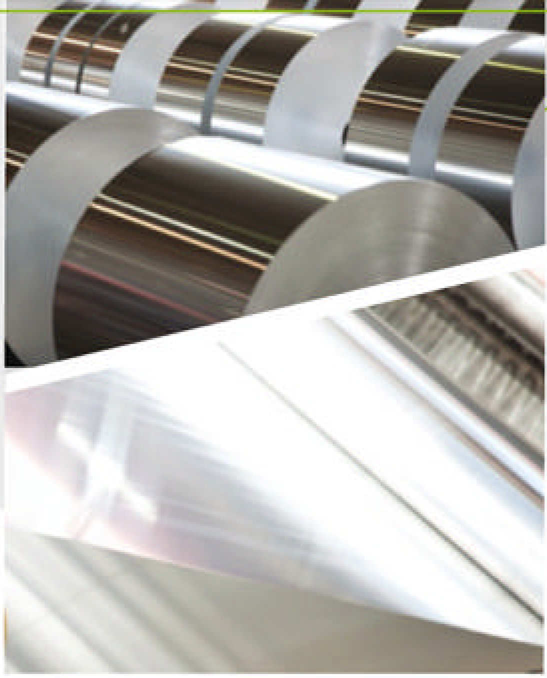
"Most of our customers are looking to be very lean," Sales says. They rely on Reliance's mill relationships, advanced processing capabilities, and just-in-time delivery to get the precise aluminum product they need, exactly when they need it.

Because Reliance companies collaborate, no one is kept waiting across the globe. "An agreement that one company has might actually be serviced by a sister company" located closer to the customer, Sales explains. "That results in a higher level of service."

Reliance's multifaceted strategy involves beefing up capacity in key regions. Last year, AMI Metals opened new service centers in France and Turkey, where aerospace orders are taking off. Almost simultaneously, Reliance acquired U.K.–based All Metal Services, the world's largest independent service center for the aerospace and defense industries.

Manufacturers who use aluminum in their products appreciate how the metal's recyclability makes their operations more sustainable over the long term. And their customers can rest easy: They know they're getting lightweight, fuel-efficient vehicles, recyclable cans, sustainable building materials, and other eco-friendly goods from responsible businesses, which consequently has a greening effect on their own supply chains.

Consider, for example, the use of chemicals in aluminum processing. Pennsylvania-based Houghton International provides specialized chemistries



for aluminum processing around the globe. Whether the final product is a can full of good-tasting beer, or a truck that is fuel-efficient, Houghton provides aluminum processors with the advanced solutions they need to exceed their production and quality goals.

One example is Alcoa's Davenport Works in Iowa, a producer of automotive and aerospace aluminum. Partnering with Houghton to use NOA (Non-Oleic Acid) technology, it has experienced dramatic and sustained cost savings. Such adopters of NOA technology can slash use of chemicals by as much as 50% and cut total associated operational costs 30 to 50%.

"Additionally, Houghton's advanced fluid technology saves our customers money by delivering sustainability benefits," says Jeewat Bijlani, Houghton's SVP, global business development and strategy. "It helps them reduce energy consumption, emissions, and amount of waste treatment required. It also creates a safer work environment."

But will this increased demand continue to climb?

Industry executives say it will. As precedent, they note what's happened in aerospace, where manufacturers increasingly use composite materials, yet aluminum consumption still rises year after year.

They also cite many pioneering European automakers, who learned early on that lightweight, durable vehicle options can help draw customers in middle-market auto segments.

In the U.S., the auto sector is experiencing an automotive revolution with the introduction of the all-aluminum Ford F-150, which demonstrates the material's advantages in a real-world application. Midsize cars could be in line for their own aluminum overhauls, because of the CAFE regulations and because U.S. customers want the extra efficiency that lies within reach, according to Constellium CEO Vareille.

"We're very bullish about the future of aluminum," Brock says, "as a modern metal that allows companies to innovate for the future while driving sustainability." ● —*G. J. MacDonald*

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Tech

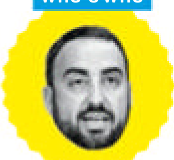
THE BREAKDOWN

By Robert Hackett

RSA CONFERENCE U.S.A.

Tens of thousands of tech-industry veterans descended upon San Francisco's Moscone Center in late April for a weeklong dive into a world that's equal parts mysterious, technical, and terrifying: cybersecurity. With corporate victims still top of mind—Home Depot, J.P. Morgan, Sony—executives are looking for answers. Let the paranoia begin.

WHO'S WHO



ALEX STAMOS

Chief Information Security Officer, Yahoo

An outspoken executive who's not afraid to call "bull"

BRUCE SCHNEIER

Cryptogenius

A privacy advocate riding a wave of interest in his new book, *Data and Goliath*

ALEC BALDWIN

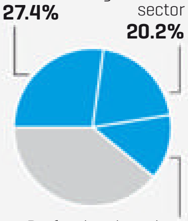
Actor

Delivering a keynote on the intersection of celebrity and privacy

THE SNOW MAN COMETH The revelations of NSA whistleblower Edward Snowden continue to loom over the industry.

PROTEST!

In 2013, reports revealing that RSA received $10 million from the National Security Agency to weaken its encryption products led several industry veterans to boycott the event. [RSA confirmed a relationship but nothing more.]



TOP TARGETS FOR CYBER-ESPIONAGE

$76.9 BILLION

Total information-security spend in 2015, as predicted by research firm Gartner

"THIS IS NOT A TECHNOLOGY PROBLEM. THIS IS A MIND-SET PROBLEM."

—AN EXCERPT FROM RSA PRESIDENT AMIT YORAN'S KEYNOTE FOR THIS YEAR'S CONFERENCE

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ACTUAL CONFERENCE SESSION TITLES

4.19.15 Metasploit Kung Fu

4.21.15 Escaping Security's Dark Ages

4.21.15 Threat Intelligence Is Like Three-Day Potty Training

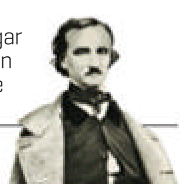
RSA CONFERENCE THEMES: A LOOK BACK

1995 Egyptian Scarab Seals

1999 Norse/Viking Runes

2005 Prohibition Rum-runners

2009 Edgar Allan Poe



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EMAIL: UNLOVED. UNBREAKABLE

YAMMER, HIPCHAT, CONVO, SLACK: Collaboration software continues to promise that it will do away with the decades-old in-box. So why are we getting more email than ever before?
By Leena Rao

ILLUSTRATION BY PABLO BERNASCONI

584,341.

THAT'S THE NUMBER of unread emails in my in-box as of this morning. There's simply no way I'm going to dig myself out, and I'm fast approaching what many others do at this point: Declare "email bankruptcy" by marking them all as read, and start from scratch. I'm not the only one in this situation. According to McKinsey, we spend nearly one-third of our workweek managing email.

Several startup companies with talkative titles—Yammer, Chatter, Convo, HipChat—have sprung up in recent years to openly wage war on email. With interfaces inspired by today's social networks, their software aims to replace email, which was designed to be asynchronous, with real-time communication tools that can be as broad or focused as needed. Businesses certainly seem to like the idea: In 2012, Microsoft paid $1.2 billion for Yammer, which is used by Shell, Capgemini, and Nationwide, and investors value HipChat parent Atlassian at more than $3.3 billion. (The startup counts Netflix, Dropbox, and Intuit as customers.)

Yet we continue to spend more time in our in-box. Even Stewart

MY MOM DIDN'T HAVE MANY OPTIONS.
TODAY'S LUNG CANCER PATIENTS DO.
Twenty years ago, my mother was diagnosed with lung cancer. She had very few places to turn, and lost a difficult struggle.
Today, we are on the brink of real breakthroughs in lung cancer research and there are significantly improved treatment options.
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Lung cancer is a formidable foe, but we are finding new ways to fight it. Please visit SU2C.org/LungCancer for questions to ask your health care professional and to learn about options that may be right for you.
Tony Goldwyn
Stand Up To Cancer Ambassador
Bristol-Myers Squibb
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SU2C.org/LungCancer
Photo Credit: Kevin Lynch
Stand Up To Cancer is a program of the Entertainment Industry Foundation (EIF), a 501(c)(3) charitable organization.

Butterfield, the founder of Slack, another email killer with an almost $3 billion valuation, says he spends three to four hours a day sifting through email. His unread-email count: 16,000.

Are we waging a war that has no chance of being won?

What we now know as email began in 1971. A team of computer programmers at Bolt Beranek and Newman (now BBN Technologies) in Cambridge, Mass., had begun experimenting with internal messaging. One of them, Ray Tomlinson, had an idea to send a text message between computers using a new network called Arpanet, routing it using an "@" symbol. It worked. By the 1980s government and military personnel were actively using the system. By the 1990s email had become one of two pillars of the budding consumer Internet, alongside the World Wide Web.

Email promised efficiency and simplicity. But Tomlinson and team could never have imagined the volume we see today. The business world accounts for more than 108.7 billion emails sent and received per day, according to market researcher Radicati Group. That number is expected to increase to 139.4 billion by 2018. What makes email so useful—its ability to work across various devices and integrate different services—is also its greatest challenge.

Like his peers, Butterfield aims to weaken email's iron grip by focusing on certain use cases. Internal work communication should be moved away from the classic in-box, he maintains, leaving email only for communication outside the workplace. The type of conversations that occur in advance of a product launch, for example, should be placed in an environment where people from different internal teams can easily see and respond to it.

And what about email exchanged with people beyond corporate walls? Yammer founder David Sacks, now COO of Zenefits, says some of the tasks for which people use email are moving to other apps. We no longer primarily use email to share photos and personal news; that's what Facebook is for. We now send files with services such as Dropbox and Box. The best way to fix email may be to let it shrink back to its first role: digital mailbox rather than catchall communications hub.

Javier Soltero, general manager for Microsoft Outlook, doesn't want to get rid of the in-box at all—just to make it more intuitive. Soltero, who late last year sold his intelligent email app, Acompli, to Microsoft for $200 million, believes that email is never going away. "Email is woven into the fabric of the Internet," he says. "This is an accumulation problem." His solution? A smarter in-box that can recognize frequent contacts and present messages from them more prominently.

Microsoft isn't the only company working on in-box prioritization. Dropbox's Mailbox quickly rose to prominence for its one-touch approach; Google's Inbox soon followed by rethinking how Gmail items should be grouped. But each message still requires interaction, however small, leaving the core issue unaddressed.

What if technologists could apply artificial intelligence to the problem? Forty-four years after programmers sent the first email, a team of talented engineers is working on just that. X.ai, a startup in New York City, is experimenting with a personal assistant called Amy to schedule meetings for clients. Copying Amy on an email—as you would with a living, breathing assistant—prompts her to check your calendar for availability and negotiate a time and place. Founder Dennis Mortensen claims Amy is accurate 98% of the time for simple tasks.

The best way to address the email problem, it seems, is to cut out the human. Which, come to think of it, may have been the answer all along.

ATTN: SIR/MADAM

HOW EMAIL SENDERS ARE IMPROVING

MARKETO The San Francisco marketing-automation company believes that focus is the future. "Delivering the right message at the right time on the right channel makes all the difference," says CMO Sanjay Dholakia. "That is what is driving revenue."

MAILCHIMP This Atlanta company's mantra? "A purchased list is a dead list." Translation: Don't send to unwilling recipients. "Positive engagement falls off a cliff," the company warned in a 2014 blog post. "The only thing that does go up? Complaints."

CONSTANT CONTACT Email should be optimized for the medium. Today it's the mobile device. "Your emails are competing directly with all the other messages people receive," says SVP Christopher Lister. So make them easy to read. —*Kia Kokalitcheva*

SAMSUNG

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WELCOME TO THE EDGE

Galaxy S6 edge

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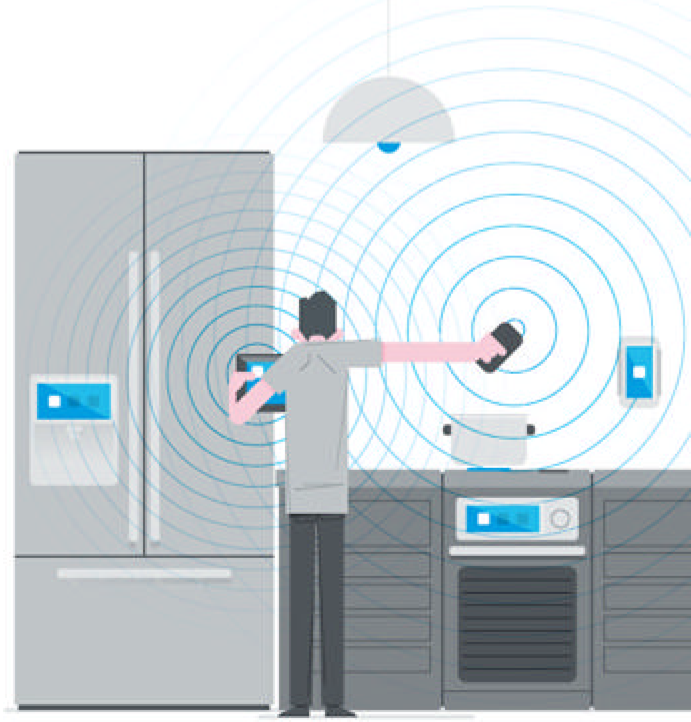
THE CLOUD IS DEAD. LONG LIVE THE CLOUD

Inspired by the tech behind the digital currency Bitcoin, IBM and SAMSUNG are re-thinking how connected devices connect—and threatening to restitch the very fabric of the Internet. *By Stacey Higginbotham*



Remember the days when everything we did on a computer started and ended with what was stored on the hard drive? That all changed with the advent of the "cloud," the distributed network of computers that lets us stash our photos in the ether and stream our favorite TV shows on a whim. In order for our computers to communicate, they needed to connect to somewhere central. That place is the cloud.

Today we're connecting so many different digital devices—refrigerators, cars, manufacturing equipment—that there's a term for it: the Internet of things. There will be 26 billion Internet-connected objects by 2020, according to Gartner. Many of them will rely on the centralized cloud.

IBM and Samsung both stand to benefit from this shift, but they question whether the centralized model is always the best approach. All those cloud computers cost money to run—and the price could exceed the revenue generated by the resulting services. If we want to affordably wire the world around us, why not let all those objects connect directly to one another?

The companies partnered to create a platform called Adept that allows, for example, a washing machine to detect its own failing part and place a service order without a direct line to the cloud. The system is built on a distributed database known as the block chain, the transactional engine that powers the bankless digital currency Bitcoin. IBM and Samsung believe that it's a faster and more secure way to connect two physical objects. Think of it like Uber for business operations.

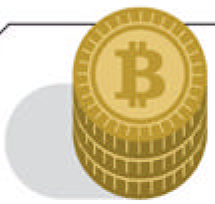
For now, cloud providers like Amazon and Microsoft have little to worry about. But change is in the air.

THE CHAIN GANG: A TRIO OF "BLOCK" JOCKS

FACTOM This Austin company has developed a service for financial institutions and hospitals that will let them store their records as part of a block chain. The goal? Prevent fraud by revealing when (and by whom) a transaction was changed.

FILAMENT This Reno startup makes rugged sensors used by companies such as SpaceX and Amazon. But the gadgets are a Trojan horse for its real goal: building a decentralized software stack based on the block chain so that customers don't have to rely on the cloud.

PEERNOVA E-commerce giant (and digital currency early adopter) Overstock.com has trusted this startup with a sizable chunk of its investment dollars. San Jose's PeerNova has raised a total of $19 million to apply block-chain technology to data security and auditing.



FINANCE

. . . SO WHAT ABOUT BITCOIN?

Even as people find more uses for Bitcoin's underlying tech, don't be so quick to write off the currency itself. The New York Stock Exchange has backed Coinbase's FDIC-insured Bitcoin exchange; more are on the way. Former J.P. Morgan bigwig Blythe Masters, who left the bank last year, has joined a Bitcoin startup. And New York now has a set of regulatory guidelines for digital currency called (what else?) BitLicense. —*Daniel Roberts*

ILLUSTRATIONS BY MARTIN LAKSMAN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BEAR MARKET WINNERS

By Jen Wieczner

DIVIDENDS COULD OFFER SHELTER IN STORMY MARKETS

"Aristocrat" stocks have long track records—sometimes decades long—of increasing their dividends. And they've held up better than their peers during bear markets.

DON KILBRIDE USED TO THINK of dividend growth as simply an interesting financial concept. Since the crash, he's come to see it as just about the most important arrow in a stock investor's quiver.

What converted Kilbride was the performance of $24.6 billion Vanguard Dividend Growth, the largest of several portfolios he manages at investment giant Wellington. The fund's holdings tilt toward companies that have consistently increased their

ILLUSTRATION BY RDN STUDIO

dividends every year, some of them for decades. During the 2008 free fall, when the S&P 500 declined 37%, Vanguard Dividend Growth lost only two-thirds as much—cushioned by those cash-generating stocks. And as the market recovered, the fund recouped its recession losses far faster than its peers. Kilbride says he's now convinced that dividend growth is the key to riding out bad markets and thriving in the long term: "The power of this thing is meaningful, and it has a long runway."

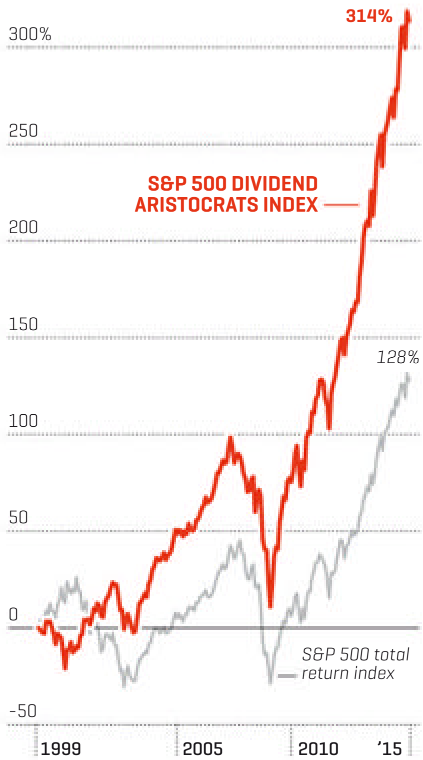
Investors have treasured dividend growers for ages, of course, and their recent performance has justified the love. Since the beginning of 1999, the S&P 500 Dividend Aristocrats index—made up of companies that have increased their dividends for at least 25 consecutive years—has returned 314%, more than double the broader market. (Even with dividends excluded, they trounce the S&P 500.)

But as the bull market wears on into its seventh year and a correction feels inevitable, many pros are noticing what Kilbride has—that aristocrats weather downturns far better than the average stock, falling less and recovering faster. After the financial crisis, the Aristocrats index returned to pre-crash price levels within two years, half the time it took the S&P 500. And after the dotcom bubble, the Aristocrats rebounded to pre-bust heights in 2001; it took the S&P 500 almost six years longer to regain its 2000 peak.

Katherine Nixon, who oversees $224.5 billion as chief investment officer of Northern Trust Wealth Management, is steering clients into dividend growers like 3M (which boasts 57 years in a row of increases) and Target (43 years). Their stability and reliable payouts reassure shareholders, Nixon says: "When investors are sailing in white water, there's something very comforting about a buoy."

Granted, many investors are already clutching that buoy. In late 2013, ProShares created the first exchange-traded fund tracking the Aristocrats (ticker: NOBL); it has already attracted about $700 million, making it "one of our most successful strategic products out of the gate," says ProShares CEO Michael Sapir. It's easy to see why. The Aristocrats have outperformed the S&P 500 in every year but one since 2008, and at a time of low interest rates, their yields appeal to income seekers. As a result, the S&P Aristocrats trade at 19.5 times 2015 projected earnings, 9% higher than the market as a whole.

Dividend bulls say it's worth paying a premium for the security and steady cash flow. Tom Huber, manager of $4.8 billion T. Rowe Price Dividend Growth, says a tradition of dividend increases demonstrates that management



is committed to shareholders even in the worst of times. "You wouldn't want to be the CEO to break the string," says Huber.

As Louis XVI could tell you, even nobility can be vulnerable. Many investors believe a rate hike could hurt dividend growers by making their payouts less attractive relative to bond yields. And serious woes can strip an aristocrat of its title faster than a royal divorce, to the detriment of its share price—as Bank of America and Pfizer illustrated after cutting their dividends during the financial crisis. One factor in the Aristocrats index's impressive returns is that dividend growers that hit turbulence often fall out of the ranks: Of the 60 aristocrats in the S&P 500 before the financial crisis, 17 were removed in '08 and '09.

That's an argument for hedging against risk by owning many dividend growers—including those with shorter track records. Don Taylor's $17.6 billion Franklin Rising Dividends Fund requires holdings to have posted increases in only eight of the past 10 years. Taylor bought medical-tech manufacturer Becton Dickinson in 1996, when it had a mere 23 years of dividend growth; it has since returned about 750%.

Scott Davis, manager of the $9.1 billion Columbia Dividend Income Fund, recently bought Apple (which reinstated its dividend in 2012) and biotech giant Gilead (which initiated a dividend in February). But he also owns stalwarts of the old aristocracy, including Johnson & Johnson, a 52-year dividend increaser. "They've been in business since the Grover Cleveland administration," Davis says. During the last bear market, he notes, "I didn't read that Johnson & Johnson was going out of business."

"When investors are sailing in white water, there's something very comforting about a buoy."

—Katherine Nixon, CIO, Northern Trust Wealth Management

GRAPHIC SOURCE: S&P CAPITAL IQ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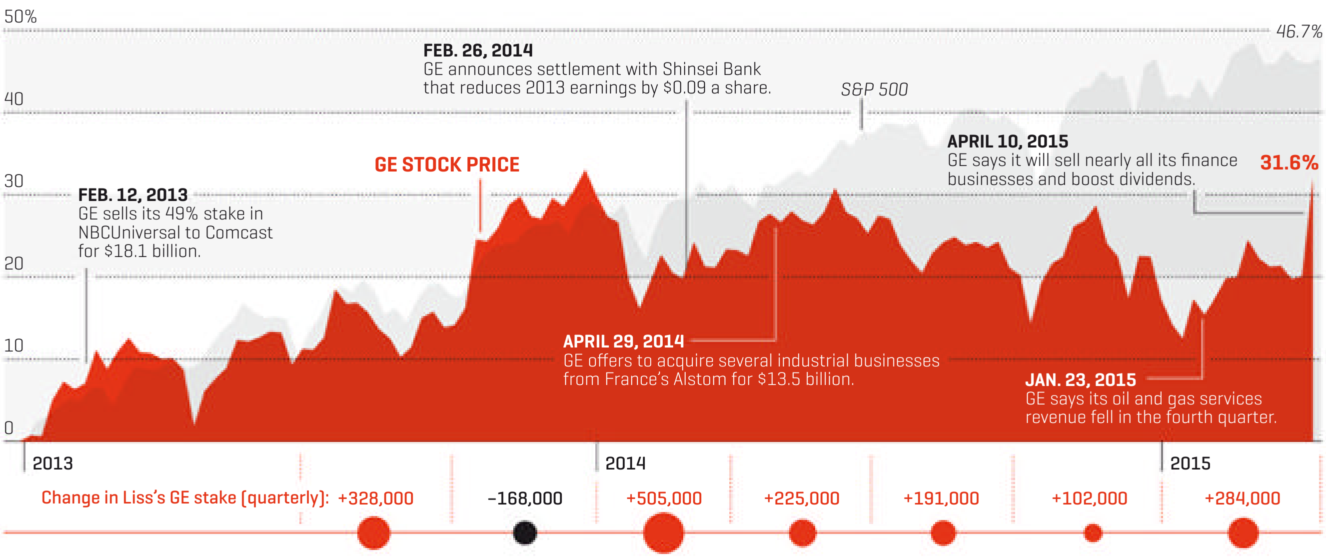
GE Returns to Its Roots

AMERICAN CENTURY'S MICHAEL LISS SAYS GE'S INDUSTRIAL BUSINESSES COULD ENABLE ITS EARNINGS TO SOAR. *By Lauren Silva Laughlin*



Michael Liss, who manages $6 billion for the American Century Value Fund, defines "value" in terms Warren Buffett would recognize. He likes companies with plenty of cash on their balance sheets, in sustainable businesses with high barriers to entry. That philosophy has helped Liss's fund beat the S&P 500 by an average of 4.5 percentage points annually over the past 15 years. More recently it led him to sharply increase his fund's stake in General Electric. Liss thinks GE's efforts to get out of finance and concentrate on its core industrial businesses will fuel steady growth in profitability.

FAREWELL, FINANCE

The company's announcement in April that it would shed most of GE Capital, its finance arm, was "exactly what we thought they should do," says Liss. A sluggish lending climate and tighter regulations had turned GE Capital into a low-margin business, not unlike NBCUniversal and GE's appliance division, units the company also recently shed. These divestments will enable GE to focus on its large industrial businesses such as aviation and transportation, which are supplying equipment to airlines and railroads that serve growing emerging-market economies, Liss says.

IMPROVING PROFIT MARGINS

GE's efforts to change its business mix have made it less efficient of late, Liss says. While profit margins held up decently during the recession, "they didn't increase as much as we thought they should have following it." Things are improving on that front, however: Margins at GE's industrial-production businesses—essentially, everything but the finance arm—went from around 11% in 2011 to just under 14% in its most recent quarter. Liss sees GE's margins improving one percentage point or more annually for the next several years.

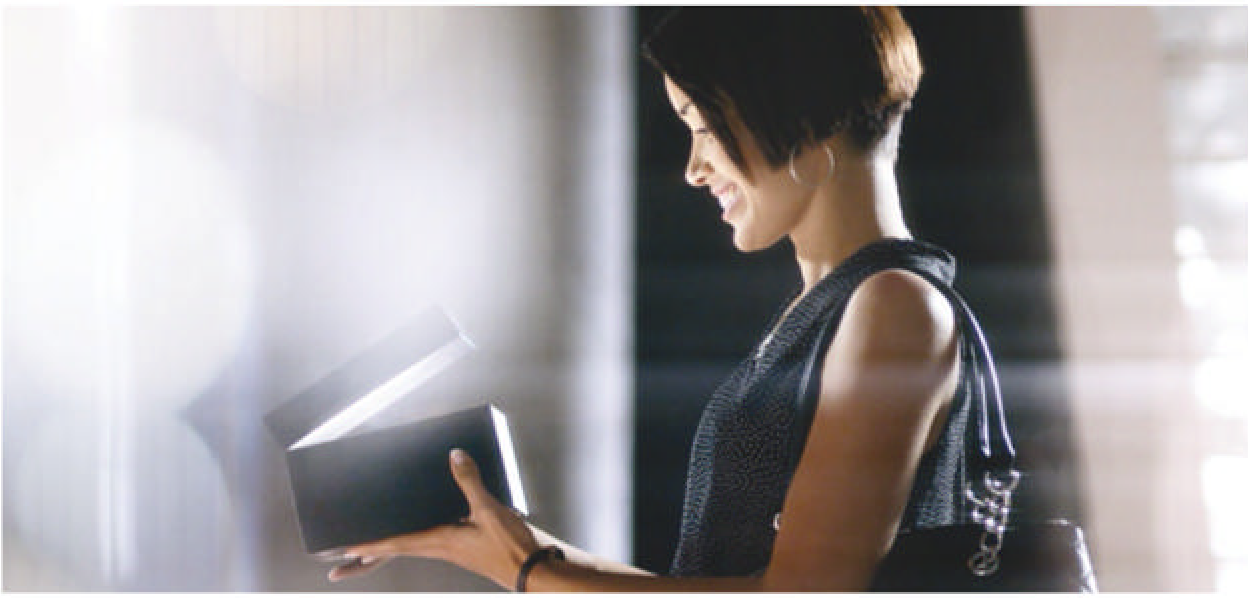
STRONG CASH POSITION

GE has very little debt on its balance sheet, which has allowed it to make smart acquisitions in recent years, says Liss, including the purchase of oil and gas services companies and its $13.5 billion deal (announced last year) to buy several units of French industrial conglomerate Alstom. GE's strong balance sheet also allows the company to buy back stock and increase its dividend, Liss notes: The company recently committed to returning some $90 billion to investors by 2018 through those means.

THE STOCK'S STILL CHEAP

GE's stock jumped 15% after the GE Capital spin-off announcement, but Liss thinks it has further to climb. Earnings have been dragged down by low oil prices (which hurt those oil and gas services businesses) and by a strong dollar. Once these dynamics improve, Liss says, earnings from industrial businesses could climb to nearly $2 a share from the roughly $1.10 a share expected this year. Given the high barriers to entry in the industrial-products field, Liss thinks GE shares should trade at around 17.5 times earnings, or in the low $30s, in the next year or so.

GRAPHIC SOURCE: S&P CAPITAL IQ



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Forget Buffett the Investor. Follow Buffett the Manager

Warren Buffett boasts a 50-year record of success as a CEO. So why hasn't corporate America done more to imitate his management style? Blame executive-suite timidity ... and Wall Street.

BY ROGER LOWENSTEIN

Warren Buffett is regarded as the best investor of our time; arguably, his management record is just as singular. He took over as head of Berkshire Hathaway in May 1965—50 years ago. And he is still at it. Think about that. Alfred P. Sloan, perhaps the most storied CEO in American business, ran General Motors for 23 years. John D. Rockefeller ran Standard Oil for 27. In recent times, Bill Gates was CEO of Microsoft for 25.

But here's the thing. Investors around the world avidly mimic Buffett's investment approach, yet it's fair to say his managerial model has had zero impact on the corporate culture. Charlie Munger, Buffett's longtime partner and Berkshire's vice chairman, says the "Berkshire system" is essential to its success. Nonetheless, Munger wrote in this year's annual shareholders letter, "No other large corporation I know of has half of such elements in place."

One hallmark of Buffett's management is unusual attention to capital allocation (for Buffett, adding a company to Berkshire is akin to adding a stock to an investment portfolio). But once he makes an acquisition, he almost never sells, and gives managers extreme autonomy. Another is shunning of bureaucracy. Berkshire has no processes to standardize the more than 60 operating units it owns, no companywide budgeting for a conglomerate with 340,000 employees. A third hallmark is renunciation of familiar rituals that in Buffett's view promote short-term thinking. Thus, no earnings guidance, no regular stock splits, no stock options.

Admittedly, not every aspect of Buffett's style would fit every business, and you can argue that elements of his approach can lead to problems. (More on that later.) But over the half-century of his management, Berkshire's stock is up 12,000 times, while the Dow Jones industrial average is up 18 times. Berkshire's market cap is $350 billion, the third highest in America. You'd think some manager would find something worth imitating.

(A disclosure: I'm invested in Berkshire, I sit on the board of a mutual fund that owns the stock, and I'm the author of a Buffett biography. So don't look here for a disinterested forecast of Berkshire's future.)

Oddly enough, Buffett's signature tactic—friendly acquisitions of strong, well-led companies—was violated when he bought Berkshire itself. As Buffett tells it in his most recent shareholders letter, his takeover of Berkshire, a textile manufacturer besieged by low-cost rivals, came about almost impulsively. After his investment partnership bought a stake, Buffett grew disenchanted with the company's management strategy. He eventually bought a controlling interest and ousted the CEO. That was in 1965, when Buffett was all of 34 (he is 84 today).

Buffett's first lesson came from observing the former CEO's errors—don't put good money into a bad business,

ADAM JEFFERY—PCNBC/NBCU PHOTO BANK VIA GETTY IMAGES

even if it's the business you are in. Berkshire struggled in textiles for 20 more years; all along, Buffett deployed its meager profits into greener pastures. By the time he closed the mill in 1985, Berkshire owned major interests in insurance, newspapers, candy, and manufacturing, along with a large portfolio of common stocks.

By then, Buffett's investment partnership had liquidated: Its investors received stakes in Berkshire, and Buffett became the largest individual owner. The partnership legacy is important because the company is still run like a partnership. Berkshire's directors get only token compensation; they don't get liability insurance either. And they have purchased large amounts of stock. This arrangement—almost unheard of in corporate America—means the directors must truly believe in their mission.

How to Run Your Company the Way Buffett Does

THREE MANAGEMENT TAKEAWAYS FROM WARREN BUFFETT'S 50 YEARS AT BERKSHIRE HATHAWAY.

Leave your managers alone. Managers at the 60-plus business units owned by Berkshire have a lot of autonomy, and that encourages them to stick around.

Bureaucracy must die. Extra layers of corporate decision-makers in budgeting, legal affairs, and public relations mean you'll miss opportunities.

Don't massage the stock price. Earnings guidance, stock splits, and spin-offs are short-term moves that do little or nothing for your shareholders in the long run.

The partnership ethos is also visible in Buffett's relations with stockholders. Buffett does not do things to buoy the stock in the short term (such as issue earnings guidance), because he seeks to encourage long-term ownership. He rarely uses shares to pay for acquisitions, because he does not want to dilute the stock.

Buffett also shuns stock options because they could unhitch the interests of executives from those of ordinary investors. Indeed, in executive pay, Berkshire staggeringly departs from convention. Buffett and Munger collect salaries of $100,000 each; neither receives a bonus. (Many CEOs haul in $100,000 every day or so.)

If greed dissuades rivals from adopting Buffett's pay model, something else—call it managerial insecurity—inhibits them from replicating his indifference to short-term results. Many CEOs live in mortal fear of disappointing Wall Street, and often settle for the appearance of value as distinct from the substance. Stock splits to increase liquidity are a sign of this mentality, as are spin-offs of corporate assets to "unlock" value.

Lawrence Cunningham, a professor at George Washington University and the author of *Berkshire Beyond Buffett,* says Buffett learned much of his management style from Tom Murphy, the retired Capital Cities/ABC CEO. (Buffett was a big Cap Cities investor, and Murphy now sits on Berkshire's board.) But Cunningham notes that public companies that try to imitate Buffett face obvious hurdles. Witness GM, where short-term shareholders recently demanded that the company distribute billions in cash (even though GM is only a few years removed from bankruptcy). Anxious to avoid a proxy battle, managers caved; Buffett's controlling position, like that of a private operator, insulates him from such pressures.

Still, Berkshire is public, and its style violates some governance norms. As Buffett recently wrote, "We trust our managers to run their operations." That honor system slipped in 2011, when David Sokol, head of Berkshire's energy business, was revealed to have invested $10 million in a company and then recommended that Berkshire acquire it. While that affair tarnished Berkshire, Cunningham depicts it as the downside of a worthwhile tradeoff. If Berkshire beefed up its governance bureaucracy, he says, "it would slow decisions, you would miss opportunities, and there is no guarantee you would not have problems."

Is it possible that Berkshire works—and this is the question that causes agony for shareholders—only because Buffett runs it? Arguably, had a rules-bound, less cozy board (one stuffed with fewer of Buffett's associates, friends, and family) sent Buffett to pasture at, say, age 65, its shareholders would now be poorer. "How many people do you think could do what Warren does?" Munger asks rhetorically.

Yet letting other companies off the hook because Buffett is special seems too pat. His and Munger's basic complaint—that corporate America is too bureaucratic and too obsessed with the short term—is absolutely correct. Munger, in his letter, argues that "versions of the Berkshire system should be tried more often elsewhere, and the worst attributes of bureaucracy should much more often be treated like the cancers they so much resemble." It is hard to think of another company where the vice chairman would violate protocol by lecturing his peers and employing such an insensitive metaphor. Other executives should try it.

Roger Lowenstein is the author of America's Bank: The Epic Struggle to Create the Federal Reserve *(to be published in October 2015).*

FORTUNE

EXECUTIVE TRAVEL BRIEFING

SAVOR THE JOURNEY
MAY 2015

Secrets of Effective Meetings

BY JANET LIBERT, EDITOR, *FORTUNE EXECUTIVE TRAVEL*

We all believe we have too many meetings, and frankly, I don't see that changing. What *can* change, though, is that we take the time to plan so we achieve the strongest outcome from these meetings.

So often, the clients and colleagues we need to meet with are many miles away. Wouldn't it be nice if we could just stick to emails and phone calls, with a few videoconferences thrown in? The fact is, meeting via technology will never be as effective as interacting face to face. Both science and our experience bear this out. Travel makes successful interactions possible.

I, for one, am determined to lead better meetings. My hope is that this *Executive Travel Briefing* will inspire you to do so, too.

Savor the journey.

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Meeting Overload

The latest research can help you get past the meeting blues and make the most of your time.

By Alina Dizik

Dreading your next meeting? You're not alone. By some estimates, 11 million meetings occur in the U.S. each day, and workers spend at least six hours per week in them, according to the *MIT Sloan Management Review*. Unfortunately, participants say about 50 percent of meetings are ineffective and unnecessary.

Rather than avoiding them altogether, organizers can find ways to cut down on the negative feelings associated with meeting overload, say experts. Much of the time it's about setting goals and following up to make sure those goals are met. "The real issue is inefficiency—I call it 'death by meetings,'" says Caroline Dowd-Higgins, a career and executive coach in Bloomington, Ind., and director of professional development at Indiana University Alumni Association.

We look here at five common objections to meetings and how to take your next gathering above and beyond.

"I could get real work done if I didn't have to attend this meeting." Organizers can send invitees three meeting goals to set the agenda in advance and keep meetings short, says Evan Thompson, a Toronto-based executive coach in the financial services industry. Include "a short intro talking about why the meeting is important to the team," he says, adding that invitees should be encouraged to make their own decisions about whether to attend. To keep meetings shorter, suggest a walking meeting, which is on average 34 percent shorter than a sit-down one, according to research from the University of Missouri.

"This meeting is bogus. Decisions have already been made or will be made later by someone else." Participants need a sense of autonomy and acknowledgement during meetings to feel like they can actually make a difference. Allowing participants to speak up at least once during the discussion is key, says Dowd-Higgins. Additionally, rather than lead each meeting, Dowd-Higgins sometimes asks her

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Meeting Overload Continued

staff to take turns organizing and leading a meeting. Giving participants the opportunity to lead helps them feel more invested in the outcome. "Employees feel empowered when they are seen and heard," says Dowd-Higgins.

"There's no real purpose for this meeting—nothing concrete will come of it."
To avoid having attendees walk away uninspired, says career consultant Brenda Stoltz, put results of the meeting in writing. "Have an outcome document which shows what was decided or actions to be taken," says Stoltz, who is based in Leesburg, Va. Include an estimated deadline, and document those responsible for carrying out initiatives. Store the information virtually by using a smartphone app such as Meeting Minutes Pro, which allows users to organize meetings and keep track of results without a slew of follow-up emails to participants.

"Everyone else at this meeting is distracted by phones, side conversations and doing other work on their laptop."
While some meetings require the use of projectors or laptops, there are plenty of instances when going analog is key. To avoid distraction, Dowd-Higgins sometimes passes around a plastic bin or box before the meetings so attendees can safely store electronics. "It democratizes the meeting and levels the playing field," she says. "Making it very low-tech means people actually need to speak to each other." Additionally, participants are encouraged to bring notebooks and take notes—even doodling is thought to spark creativity and encourage memory formation, according to researchers at University of Plymouth in England.

"This meeting totally interrupted my flow with the work I was doing in my office."
Rather than interrupting times of the day when workers are thought to be most productive, schedule meetings at times they're most unlikely to sit still. Behavioral scientist Dan Ariely recommends, for example, doing the toughest tasks during the first two hours of work. Afternoons tend to be when most office workers are at their least productive, so scheduling a meeting during that post-lunch slump can help use everyone's time more wisely. If you must disrupt flow during a productive period, take a few minutes before the meeting to jot down notes about what you were doing so "you can pick it up more quickly when you return," says Stoltz. ET

ALINA DIZIK *is a freelance writer whose work has appeared in numerous business outlets.*

Book a Cool Meeting Space When You Travel

Here's a look at the latest crop of creative meeting spaces popping up around the country:

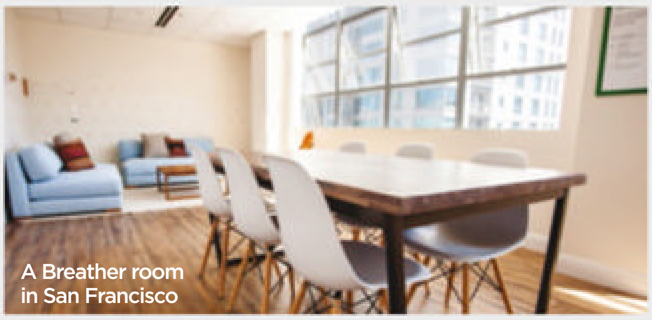
San Francisco: Start-up Breather offers innovative rooms for meetings in places including Montreal, New York and San Francisco. A Scandinavian-style loft in the Yerba Buena neighborhood starts at $25 per hour. All properties come equipped with Wi-Fi and can be rented by the hour (*breather.com*).

Boston: District Hall, the city's innovative tech space, allows anyone to come hang out for a meeting without prior reservations. A local coffee bar and dry-erase boards covering some walls make it easy to have a caffeine-fueled brainstorming session (*districthallboston.org*).

New York: Grind, a co-working community with three New York locations, allows members to settle down away from the crowd for $40 per day or a discounted monthly fee. For a last-minute meeting, visitors can book a soundproof conference room that fits up to eight people for $75 per hour (*grindspaces.com*).

Chicago: Catalyst Ranch, a 15,000-square-foot meeting venue in the city's West Loop, can feel more like a carnival than a meeting space. Rooms of all sizes mimic a Mexican hacienda style with colorful seating, vintage rugs and artwork from around the world. Prices are $92 per participant for a full-day meeting (*catalystranchmeetings.com*).

Los Angeles: Space Abbot Kinney, a penthouse for meetings in Venice, Calif., has flexible rooms, an outdoor deck, a private VIP entrance and a glass atrium lounge. There's gallery lighting rather than harsh office lighting, so meetings take on a decidedly less corporate feel. Rental rates start at $500 (*spaceabbotkinney.com*).



A Breather room in San Francisco

FROM TOP: © SERGEY NIVENS/ISTOCKPHOTO; COURTESY OF BREATHER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The Power of STEM

STEM education projects across the country are empowering students to start changing the world now, one innovation at a time.

Fifteen public schools across the country are national finalists in the **Samsung Solve for Tomorrow Contest**. These students are proving what a difference STEM can make in their communities. Their projects tackle issues ranging from water conservation and food sustainability to cleaner air and assistive technology. Finalists have used STEM—science, technology, engineering, and math—to address problems in need of solutions. These students have worked with local groups, government officials, and engineers to research their projects, and have discovered how classroom concepts can have a concrete effect on society.

In mid-March, the National Finalists featured below presented their projects to a live panel of judges in New York City. From there, five national winners were chosen and each awarded more than $135,000* in cash and technology to further support STEM learning.

Indicates National Winners | * Estimated Retail Value

SWATTING MOSQUITO-BORNE DISEASE

Lawrence County High School

Alabama

To combat the spread of the debilitating chikungunya virus, the students at Lawrence County High School developed environmentally friendly options for mosquito control. The goal was to reduce the number of mosquito breeding grounds, and to collaborate with community leaders to develop a long-term plan for continuing education about the virus.

TURN DOWN THE SOUND

Clarendon School

Arizona

Sounds increase heart rate, raise blood pressure, and release stress hormones in the body. Over time, this sound stress can lead to lowered immunity, sleep deprivation, and impaired cognitive ability. The students at Clarendon School created an auditory map of their school by recording and analyzing data of decibel levels to better understand the health implications, and then made recommendations to reduce noise on campus.

FLOOD SAFETY IN A "FLASH"

Caddo Hills High School

Arkansas

The students at Caddo Hills used real-time data to create weather alerts and warning systems specifically for their region. This potentially life-saving information will help residents develop action plans in the event of dangerous weather, such as tornadoes and flash floods that are common in this area. The data will also detail procedures that residents should take if severe weather should strike while camping in the region.

DON'T WASTE A DROP

Downtown College Prep

California

With the ongoing drought, water conservation in California is a top priority. The students at Downtown College Prep designed an affordable, easy-to-install water conservation system that will enable users to reduce their water consumption by 20%. This reduction in water usage will also limit the amount of water being recycled and treated in public facilities.

CREATING CLEANER WATER

Imagine Hope Community Charter School

Washington, D.C.

The students at Imagine Hope Community Charter School partnered with a nonprofit to identify water-conservation methods. Students also researched suggestions from a variety of water conservationists looking at ways to reduce urban water usage. Finally, students wrote letters to national and local agencies to share their findings and volunteer to help apply them.

KEEPING COOL WITH SALT WATER

James Campbell High School

Hawaii

As the state evaluates plans to install solar-powered air conditioning in all classrooms, students at James Campbell High School explored another path: salt water. They used this abundant natural resource to power the small, desk-mounted fans they built to cool their classrooms. In the process, they learned how natural resources can meet some of the energy demand in their community.

MODIFIED MOBILITY

Caesar Rodney High School

Delaware

Young children with little or no lower body mobility due to cerebral palsy can outgrow an expensive motorized wheelchair quickly. The students at Caesar Rodney High School redesigned electrical and mechanical components of a children's Power Wheels car to enable hand-controlled movements rather than mobility via foot pedals.

COMMUNITY GREENS

Frankie Woods McCullough Academy

Indiana

The students at Frankie Woods McCullough Academy constructed, and are maintaining, a greenhouse and community garden. The process allowed them not only to grow fresh fruits and vegetables that can then be shared with a local food pantry, but also to explore the importance of fresh food and how it can affect the environment, their community, and their health.

ROBOTIC STORM DRAIN EXPEDITION

Nicholson Elementary

Mississippi

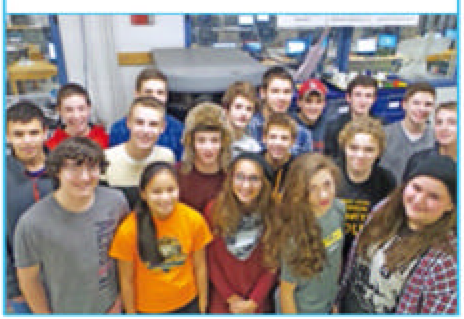
The field of robotics invokes limitless design and engineering possibilities. The students at Nicholson Elementary put that to the test by creating a prototype robot with the ability to survey local flooding issues caused by storm-drain obstructions. Students presented their findings to the city council along with the estimated cost of the project.

COMBATING ILLEGAL TRASH DUMPING

Bow High School

New Hampshire

Using smartphone technology, the students at Bow High School created a feature that allows them to survey local forests in order to identify areas being used to dump trash. Then students developed recommendations for town planners to restrict access to such areas of the forests. They also coordinated projects with local civic organizations to clean up the areas most affected.



WHEELCHAIR INNOVATIONS

Galena High School

Nevada

Most of us take for granted tasks as simple as turning on a faucet or opening a door. The engineering students at Galena High School decided to use STEM knowledge and skills to create adaptive equipment that physically- and intellectually-challenged individuals could use to improve quality of life.

VERTICAL VEGGIES

Northwest Pennsylvania Collegiate Academy

Pennsylvania

The students at Northwest Pennsylvania Collegiate Academy live in an urban section of the state that doesn't have ready access to fresh fruits and vegetables. To help remedy the situation, they planted vertical gardens to grow on walls and fences. The hope is that such space-saving methods will encourage residents to grow their own gardens and have access to healthier food.

OUR TOWN IN THE PALM OF YOUR HAND

Cedar Cliff Middle School

Ohio

To help local residents, visitors, and college students better connect with one another, the students at Cedar Cliff Middle School created a mobile app that lists all events and happenings in the community. The students also designed the app to connect with e-books that residents would find useful.

A DELICIOUS WAY TO RECYCLE

Hudson's Bay High School

Washington

To cut down on the cost of paper waste removal, students at Hudson's Bay High School turned to mushrooms. They spread a paste of mushroom mycelia over discarded paper, and, in about 45 days, the mycelium essentially "ate" the cardboard, and pearl oyster mushrooms began to grow. Culinary arts students then use the mushrooms in high-protein veggie burgers that the district can sell.

TROUT REROUTING

Meeteetse Schools

Wyoming

Native Yellowstone cutthroat trout are an essential—and endangered—part of the ecosystem. The students at Meeteetse Schools worked with local groups to survey threats to these fish, with a goal to develop preservation methods that will aid in upstream migration, helping to ensure the survival of this precious species.

CAN BIOGEN BEAT THE

MEMORY THIEF?

OF THE LEADING CAUSES OF DEATH, ALZHEIMER'S DISEASE IS THE ONLY ONE FOR WHICH THERE IS NO WAY TO PREVENT IT, CURE IT, OR SLOW ITS PROGRESSION. A BOSTON-AREA BIOTECH MAY BE CLOSER THAN EVER TO SOLVING THE PUZZLE.

BY ERIKA FRY

ILLUSTRATION BY SINELAB

Even b

JEFFREY SEVIGNY STEPPED TO THE PODIUM, IT WAS CLEAR THAT SOMETHING MOMENTOUS HAD OCCURRED IN THE WORLD OF ALZHEIMER'S RESEARCH. BEFORE BIOGEN'S SENIOR MEDICAL DIRECTOR

for clinical development could click on the first slide of his PowerPoint deck, tens of billions of biotech investment dollars had already been wagered on what his presentation would say.

The day before Sevigny's March 20 talk at the International Conference on Alzheimer's and Parkinson's Diseases, analysts at Credit Suisse Group—following buoyant reports by Barclays, Citigroup, and RBC Capital—projected that Biogen's stock would soar to $500 a share, up from the $400 target they had estimated less than two months earlier. Shares of the Cambridge, Mass., drugmaker, then trading at $428, were *already* up 41% from early December, when the company teased investors with findings about its investigative Alzheimer's drug, aducanumab, the details of which Sevigny would share fully at the conference. The three-month stock run-up had added a staggering $29 billion to Biogen's market capitalization.

In a sense, the news had happened. And yet, for an anticlimax, Sevigny's report to the roughly 2,500 scientists, investors, and biotech reporters crowding into the Acropolis convention center in Nice, France, was thrilling. Attendees, it seems, couldn't help themselves from buzzing, as they snapped photos of Sevigny's slides with their smartphones and kept Twitter ablaze with commentary and a kindling of data.

The reason was obvious: For the first time ever, a drug appeared both to significantly remove the brain plaques associated with Alzheimer's disease and to slow the terrifying cognitive decline suffered by patients. But, then, so was the awkwardness of the moment—a collective whisper that reminded the crowd to squelch the thrill if they could.

This was Alzheimer's, after all—the pathology that ate promising drugs and spit them out, the disease for which pharmaceutical science had the worst batting average of all. Of the 244 compounds that drug companies had tested against the disease in clinical trials from 2002 to 2012, just one had received FDA approval, according to a study last year by researchers at the Cleveland Clinic. (Fourteen are still in clinical testing.) That translates to a 0.4% success rate, compared with 19% for cancer drugs. Only five Alzheimer's drugs have ever been approved, of which four remain on the market. All are aimed at treating symptoms of the disease, such as memory loss, rather than the illness itself—and none is considered by experts to be particularly effective. Of the top 10 causes of death in America—Alzheimer's is now No. 6—it is the only one for which there is no way to prevent it, cure it, or even slow its progression.

The outlook has been even worse for drugs like "adu" (as *Fortune* will abbreviate it), Biogen's experimental antibody, that go after beta-amyloid—bits of broken protein that clump together to form, presumably, neuron-choking plaques in the brain—leading some to wonder whether we've been chasing the wrong target. More than 70 anti-amyloid agents—

The Brains Behind Aducanumab
From left: Ajay Verma, vice president of experimental medicine; chief medical officer Al Sandrock; and Doug Williams, executive vice president of R&D, discuss their Alzheimer's antibody at Biogen's Cambridge, Mass., headquarters.

PHOTOGRAPHS BY
BOB O'CONNOR

efore

including high-profile drugs from Eli Lilly, Roche, and a combined effort by Elan, Pfizer, and Johnson & Johnson—had been tested in clinical trials. None had been successful. "We've seen them before, and we've seen them fail," says Morningstar analyst Karen Andersen, who was determined not to get too excited before seeing the Biogen data.

As if all that wasn't enough to temper excitement, there was this: Biogen's study on adu was a so-called Phase 1b, whose aim was merely to find an appropriate dose of the drug and, to a preliminary degree, assess its safety. The trial, which itself was not yet complete, involved a mere 166 patients, nowhere near enough to draw any definitive conclusions. What's more, those who received higher doses of the agent and who saw the biggest responses were also at greater risk of developing a potentially serious complication: swelling in their brains.

Still, by the time trading on the Nasdaq exchange was done on March 20, Biogen shares were at $476, not far from Credit Suisse's lofty target. Within days of the Nice conference, Goldman Sachs analysts pegged future peak annual sales of adu—which even in the best-case scenario was years away from approval—at $8.4 billion. Others on Wall Street put the figure much higher.

And though the Alzheimer's research community was perhaps not as breathless as some investors, many were more excited than they'd ever been about a drug trial. Of the 25 academic and industry researchers interviewed for this story, few did not note Biogen's study results with enthusiasm. "If the treatment's clinical benefit is confirmed, it would be a game changer in the scientific fight against Alzheimer's," says Eric Reiman, executive director of the Banner Alzheimer's Institute. Says Brian Basckai, a professor of neurology at Harvard Medical School who has studied the effect of adu in mice: "This is the most successful clinical trial in Alzheimer's disease ever."

"There's a little bit of a mania going on," says P. Murali Doraiswamy, director of Duke's neurocognitive disorders program, who is also impressed with the Biogen findings. Or as one prominent biotech blogger described the mood: "euphoria."

Even industry competitors seem energized and impressed. Michael Ehlers, chief science officer for Pfizer's neuroscience division, described the data as one of the field's biggest breakthroughs in years. To hear many tell it, Biogen's drug has been validation for the whole Alzheimer's research community. Finally, many say, after years of failure and false starts, we're at a turning point.

The story of how we got here, though, isn't a tale of one company, but rather of two: The first is Biogen, the cash-flush newcomer that bet big on a single drug (discovered by another biotech firm); the second is the 139-year-old Eli Lilly, which has spent 26 years and untold sums chasing an elusive goal, largely in its own research labs. Theirs is the pharmaceutical version of the tortoise and the hare—but with a twist. For now, it seems, the hare is winning.

A DEATH SENTENCE that progressively steals one's memory and independence, Alzheimer's is a devastating illness, one that currently afflicts 5.3 million Americans. That number is expected to balloon to some 8 million by 2025 as baby boomers age and live longer. By 2050 the figure is on track to nearly triple, even as the broader population is expected to grow by roughly 25%.

Alzheimer's, importantly, is also the nation's most expensive affliction. The cost of caring for patients—much of which is shouldered by Medicare and Medicaid—was $214 billion in 2014. The Alzheimer's Association projects that figure will reach $1.1 trillion by 2050 if current trends continue.

Such numbers have long tempted many drugmakers, who see this overwhelming medical challenge as a massive untapped opportunity. Lilly understood the potential but had only a vague idea of how it hoped to go after it when it hired Patrick May, a postdoctoral fellow at the University of Southern California, to do research on the disease in 1989.

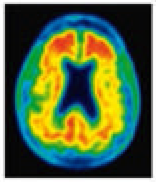
More than a century ago Alois Alzheimer, a German psychiatrist, had become intrigued by the peculiar mental state of his patient Auguste Deter, a 51-year-old woman who appeared to be prematurely losing her mind. At the time, senility was considered a natural part of aging, but Deter, who in occasional bouts of clarity told the doctor, "I have lost myself," seemed unusually young for such a fate. When she died in 1906, Alzheimer autopsied her brain: It had shrunk considerably, and its tissue, when stained, was speckled with distinctive markings in and around the neurons. These deposits—later characterized as amyloid plaques and neurofibrillary tangles, or tau—are considered the hallmarks of Alzheimer's.

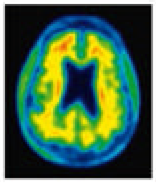
Despite this headstart, the pharmaceutical industry did not take the disease seriously until seven decades later, when researchers began to understand that Alzheimer's was not a rare condition but rather the primary source of dementia population-wide.

Rich with cash from its depression drug Prozac, Lilly threw some research dollars at the disease, and by 1995 it had a molecule, called xanomeline, that the company believed could restore memory in dementia patients. Lilly's marketing department was so excited by the prospect that it persuaded management to buy Alois Alzheimer's boyhood home in Bavaria, an ivy-covered cottage in Marktbreit, Germany, which the team hoped to showcase with the launch of the medicine. But then it failed in clinical testing.

Strangely, the early drug candidates didn't focus

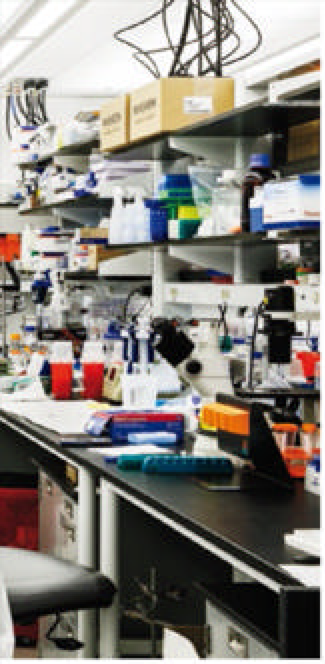
The Biogen lab (above) where research on the company's experimental Alzheimer's drug is being conducted

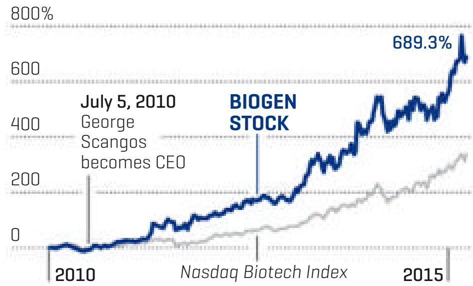




PET scans of Alzheimer's patients from Biogen's 54-week trial of aducanumab. The top image shows before treatment; the bottom, after: Amyloid plaques (in red) are greatly reduced.

PET SCANS: COURTESY OF BIOGEN





The 700% Club
Biogen's stock has raced up nearly 700% since George Scangos became CEO in July 2010, which translates to a 54% annualized return for shareholders.

on the two abnormal brain deposits that Dr. Alzheimer himself had seen in his patient: amyloid and tau. While four decades of research have not yet established the role that either plays in the development of the disease, there is a prevailing theory. Called the amyloid hypothesis, it contends that things begin to go wrong in Alzheimer's patients when beta-amyloid, a protein that normally cycles through the brain, starts to build up there—either because too much is being produced or because not enough is being cleared from the organ. That amyloid aggregates and forms plaques around the neurons, gumming up the synapses and inhibiting cellular work. This, in turn, triggers problems with tau, a protein in neurons involved in basic cellular function. As these plaques and "tangles" of tau proliferate in the brain, neurons die and more and more mental activity is snuffed out.

Patrick May was one of the field's first proponents of the idea. Early on, his team alighted upon a compound they called LY-411575, which tested so well in mice May was sure it would one day be enshrined in medical textbooks. But when tested in dogs, it filled their gastrointestinal tract with mucus. No go. One by one, he'd find himself hopeful about an amyloid-targeting molecule only to have it go bad in animal models or flame out in human testing.

Eventually, though, came semagacestat. Making it through a gauntlet of early testing, it was Lilly's first real shot at an Alzheimer's medication. Aside from a skin rash, there appeared to be no negative side effects. And in 2008, nearly two decades after May began working at Lilly, his group launched the company's first, massive Phase 3 Alzheimer's trial. Phase 3 studies are typically the largest and most expensive stage of human drug testing, and this one involved 2,600 participants in 31 countries who would be studied for 21 months.

A couple of years into the trial, Lilly received a call from the study's independent safety monitor. There was a problem: Participants who were receiving the drug were scoring worse on cognitive tests than those on placebo. Semagacestat appeared to be hastening their decline. The trial was over.

"We were stunned," says Eric Siemers, the medical director of Lilly's Alzheimer's program at the time. "If it just hadn't worked, we were ready for that possibility, but this no one expected at all. Tears were shed."

May, who had lost his wife unexpectedly several months before this news, says the only consolation was that she wasn't there to see what his 21 years of work had amounted to. "It was devastating," he says. "Just devastating."

SUCH WAS THE PROMISE of Alzheimer's drug development when George Scangos arrived at Biogen in July 2010. A biologist who, as a postdoctoral fellow, had landed on the front page of the *New York Times* for helping engineer the first transgenic mouse, Scangos had been a professor before joining the ranks of the biotech world in the late '80s.

The challenges facing Biogen then were more managerial than academic, however. The company he inherited was spread wide and thin, with scientists working across five therapeutic areas, as if it were a drugmaker four times its size. "We had too many people telling two people what to do and going to meetings all day," he says.

The country's oldest independent biotech had made its name with a handful of groundbreaking multiple sclerosis medications. It made sense for Scangos to continue to invest in that. Far less sensible, he thought, was trying to compete in the oncology and cardiovascular categories, where a number of competitors were well ahead, so he quickly shuttered those programs. A harder question was what to do with the biotech's fledgling Alzheimer's effort, which focused on a single anti-amyloid antibody, aducanumab, from a Swiss firm called Neurimmune.

Alzheimer's was not exactly natural territory for Biogen. The disease, which had stumped far bigger and better-resourced pharma companies for years, had never figured prominently in its playbook. And at least four drugmakers, including Lilly and Pfizer, were actively working on antibodies that, as with Biogen's, targeted amyloid protein. Biogen could quite conceivably be fifth to cross the finish line.

CHART SOURCE: S&P CAPITAL IQ

The sheer likelihood was that it would end up as just another company investing bucketfuls in a product—the average drug for the central nervous system consumes $1.5 billion and takes 15 years to develop—that would ultimately fail to make it to market. Still haunting the field was the memory of a disastrous trial by Elan from 2001, when the Irish company (since acquired by OTC drugmaker Perrigo), injected patients with a form of beta-amyloid on the theory that it would stir an immune response against the plaque. Hopes were dashed when 6% of clinical trial participants developed meningoencephalitis, a serious inflammation of the brain and spinal cord.

Already there was a rift among researchers—those who wanted to focus on beta-amyloid protein ("the BAPtists") and those who believed tau was a worthier target ("the tauists")—and each new amyloid drug failure only widened the schism. Increasingly, scientific critics complained that Alzheimer's research was off track, and that decades of effort and billions of dollars had been wasted aiming at the wrong bull's-eye.

Scangos had studied Alzheimer's for a brief time when he was at Bayer 14 years earlier. "It would have been foolish of me to think I understood it in depth," he now says, "but you still have to make some bets."

That's where Al Sandrock came in. A bearish man with a shock of black hair and a whiff of mad scientist about him, Sandrock was head of Biogen's neurology R&D, and he was itching to tell his new boss about adu. The antibody had been derived from genetic information expressed in immune cells of elderly donors in Switzerland who were especially healthy and mentally quick. The hunch was that the same thing that kept these individuals sharp into old age might also help keep the minds of Alzheimer's patients from failing.

Biogen scientists had been laboring to develop similar compounds in the lab to no avail. "We'd been trying to do it with old-fashioned techniques—starting with immunizing mice—and we were having a heck of a time," Sandrock recalls. "Meanwhile, my friend Roger in Zurich is fishing them right out of patients with exactly the characteristics we were looking for!"

Indeed, the antibody seemed to have remarkable properties. It bound wonderfully to amyloid plaque, and when it was tested in older mice, the plaque was greatly reduced. Biogen licensed the antibody from Neurimmune, buying worldwide rights to develop and commercialize it in exchange for royalties.

That it had originated in humans posed interesting challenges: to test the antibody in animal models, Biogen would have to murinize, or "mousify," it. The industry typically goes the other way, humanizing antibodies that were engineered in mice.

Few of Sandrock's colleagues shared his enthusiasm for the molecule, however, with many thinking that the company's foray into the Alzheimer's field was pure folly. For one thing, an antibody was considered a dubious approach—too large to even penetrate the blood-brain barrier, which was essential if it was to reach its target.

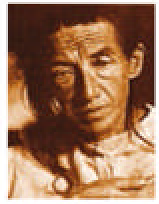
What mattered, though, wasn't that colleagues doubted adu, but rather that Scangos believed in Sandrock. "Part of being a CEO is assessing the people you have," says Scangos. "You have to make bets on who is talented, who is telling the truth, who is being straightforward, and who has a nose for good science and good medicine."

Over the next few years Biogen watched the four anti-amyloid antibodies of its rivals fail or be halted in clinical development. Even Sandrock, a true believer, felt the pressure. "I was getting hammered by many of my colleagues outside and certainly inside that the amyloid hypothesis was wrong," he says.

His boss, however, wasn't fazed in the least. "People overgeneralize negative data," says Scangos. When something doesn't work, he says, "the question to ask is, '*Why* doesn't it work?' "

That was what the Biogen team asked with regard to adu's competitors. The evidence suggested three different answers, they thought. First, some were testing their drugs on patients who didn't necessarily have Alzheimer's disease to begin with. Second, it wasn't clear that some rival agents were actually hitting their targets—which was to say, the amyloid protein. And third, the companies were testing their drugs too late: The patients were too far gone.

Auguste Deter, the first patient to have been diagnosed with the disease, died in 1906.



The Pioneer
Alois Alzheimer (seated at left) and co-workers at the psychiatric clinic of the University of Munich in 1904–05.

+

FEEDBACK
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DETER: JESSICA WILSON—SCIENCE SOURCE; ALZHEIMER: SCIENCE SOURCE

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ONE OF THE SMARTER DECISIONS Scangos made when he arrived at Biogen was to hire Ajay Verma. Verma, an energetic neurologist who previously had stints at Novartis and Merck and speaks in sweeping evolutionary terms about brain disease, is described by colleagues as the company's "Q"—the resourceful inventor in James Bond films. (Officially his title is vice president of experimental medicine.) It was his team's job to figure out how best to test adu.

His first task was making sure the patients in the trial had Alzheimer's—something that was surprisingly hard to do. Until very recently it was possible to know for certain that someone had the disease only through an autopsy (the same way it was done in 1906 for Auguste Deter). To diagnose it in living patients, physicians had to watch closely for worsening dementia, relying primarily on the accounts of friends and families or the results of somewhat crude mental tests. Such assessments often swept people with other forms of dementia into the net.

Verma, however, brought an important emerging technology into Biogen's patient-screening process—imaging equipment that allowed clinicians to pinpoint amyloid (and more recently tau) deposits in the brain and to visualize the disease's progression. The importance of this was much greater than it sounded. Of the patients who applied to join Biogen's Phase 1 adu trial, an astounding 40% didn't have the disease, despite showing signs of early dementia.

It may sound obvious, but an anti-amyloid drug, as a rule, won't work on patients without amyloid deposits in their brains. That, indeed, was a factor that plagued the trial of yet another failed Lilly drug, solanezumab. Lilly found—after the fact, unfortunately—that in a large Phase 3 trial of "sola," as many as 25% of participants didn't have amyloid plaques in the brain.

The second task, of course, was to make sure the drug was hitting the right target. Again, the answer involved the same imaging technique above, which, ironically, relied on a radioactive tracer owned by Lilly.

Biogen's innovation was to pay for all this crazily expensive imaging in a Phase 1 trial, an early-stage study that is typically used to determine the proper dose of an experimental agent. In its adu trial, 166 patient volunteers underwent a battery of procedures—from multiple MRIs and glucose brain PET scans to lumbar punctures.

But the real game changer was deciding what patient population to go after. Again, the insight derived from, among other things, the failed trials of Lilly—and that was to give the amyloid-clearing drugs to patients in the very earliest stages of disease, before too much damage had been done.

Amyloid, it turns out, begins accumulating in the brains of Alzheimer's patients some 15 years before they ever show symptoms. To the field as a whole, this discovery was the equivalent of a lightning bolt: Maybe the drugs weren't working because they were being given too late.

That's why Biogen's adu trial generated so much excitement. It showed that patients with mild—and even incipient (or "prodromal")—Alzheimer's could benefit from early therapy. Though the trial wasn't designed to measure it, the drug appeared to slow the decline in Alzheimer's patients' recall and mental agility. After a year of treatment, trial volunteers who received the drug performed strikingly better on cognitive tests than the placebo group, though such results should be taken with a dose of caution given that the sample size was very small (and the tests themselves can be squishy). Nevertheless, the fact that this apparent clinical change was accompanied by rock-solid evidence of a biological change—a significant reduction in amyloid plaque—gave the finding some credibility.

That's certainly how the Biogen team saw it, even if they couldn't quite believe it themselves. "Candidly, we were surprised," says Doug Williams, who joined Biogen as head of R&D in 2011. "I kept waiting for something to not fit, but every piece of data hung together—it was dose-response and time dependent, the placebo looked like it should have looked. It worked on all the measures."

Outside the company, many drug executives also felt a revelatory excitement. Biogen's early findings, if borne out, offered a rare financial jackpot. If anti-Alzheimer's drugs were ultimately proven to be effective as preventive meds—and patients took them early and often in the same way that millions take statins to stave off heart disease—the business model could be extraordinarily profitable. The National Institute on Aging (NIA) is now funding a handful of prevention studies to test the theory.

Duke's Doraiswamy says this has reenergized the field. "You may need to give treatment for four to six years, or preventative treatment for 10 years," he says. "Clearly it's an incredibly lucrative opportunity."

LAST DECEMBER, three months before Biogen's dramatic presentation in Nice, the company announced it was jumping adu from Phase 1 testing to Phase 3—an expensive trial with lots of patients. But even if the strong results are replicated (and there are no additional complications), Biogen won't be able to get a drug on the market until at least 2018, analysts speculate. (Perhaps reflecting that reality, the stock price has pulled back; at presstime in late April it was trading at $423.)

Which means the race between the tortoise and the hare is hardly over. Lilly has already embarked on its third Phase 3 trial with sola—this time only in prescreened patients with mild Alzheimer's disease. The NIA is also evaluating the Lilly drug, which seemed to show a slight cognitive benefit in some patients, in one of its studies. It, too, could emerge in 2018.

Moreover, both companies have plenty of other Alzheimer's drugs in their pipelines. Says Biogen's Williams: "We're quadrupling down."

Experts say that if they're approved, there may be room for all of them in the marketplace. Increasing evidence shows that Alzheimer's is a complex disease that is heavily influenced by the individual biology of each patient. As with cancer, it is likely that treating Alzheimer's in most patients will require a combination of therapies. In the end, perhaps, the tortoise and the hare may be celebrating together at the finish line.

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ILLUSTRATION BY **MATTHEW WOODSON**

HOW THE DOLLAR STORE WAR WAS WON

BY SHAWN TULLY

IT WAS THE ELEVATOR RIDE that many a CEO has come to dread. On the evening of June 18, 2014, Howard Levine, the CEO of Family Dollar Stores, arrived for his meeting at the sumptuous Museum Tower residence in Midtown Manhattan. A white-gloved lift operator hit the button to take him to the penthouse apartment on the 51st floor. Waiting for him was Carl Icahn.

Twelve days earlier, Icahn, the powerful activist investor and founder of Icahn Enterprises, had announced that he'd bought 9.4% of Family Dollar's shares. That same day the 79-year-old multibillionaire called Levine at Family Dollar's modest headquarters outside Charlotte and invited him to fly up for dinner. Like so many corporate chiefs before him—from Apple's Tim Cook to former Chesapeake Energy CEO Aubrey McClendon to Greg Brown of Motorola Solutions—Levine was being summoned for the ultimate activist experience, a ritual in which the dean of Wall Street dealmakers plays the gracious host to the target of his latest campaign while dictating exactly how things are going to go down. Levine knew he couldn't say no.

When Levine, 56, stepped out of the elevator into Icahn's 11,000-square-foot duplex, he and fellow Family Dollar board member George Mahoney were escorted by a butler to the expansive balcony. There they found Icahn mixing a batch of martinis—Ketel One vodka, up with a lemon twist—for himself and two lieutenants. "Can I get you a drink?" Icahn asked Levine. "I'd love one," replied Levine, "but I'll say no, since I want to keep my wits about me." Icahn didn't miss a beat. "Not drinking isn't going to help you," he fired back, "so you might as well drink." Levine decided to stay sober anyway.

Over a dinner of lamb chops, Icahn told Levine he should sell the struggling Family Dollar business, which Levine and his family had run for 55 years, to its bigger, better-run rival, Dollar General. If he played his cards right, Icahn suggested, he might even get a bidding war going. "Carl said he'd broker the deal, that he was the one to get the best price," Levine recalls. Levine argued that trying to sell to Dollar General was futile. He maintained that he had great plans for reviving his own company. When Levine blamed a Family Dollar problem on another, recently departed executive, Icahn cut him off.

"Stop making excuses!" the blunt, Queens-born billionaire replied. "Tell it to your mother." Levine couldn't help laughing. He'd heard all about Icahn's cocktail for confronting CEOs: jiggers of brute force mixed with splashes of high comedy.

There are few bigger stories in corporate America than the rise of activist investors in recent years. The dinner attested to the immense clout wielded by Icahn and a handful of billionaire activists. And the ceremony drove home the new, undeniable reality for Levine: Whether he liked it or not, his company was now in play, and he would have to scramble to influence events.

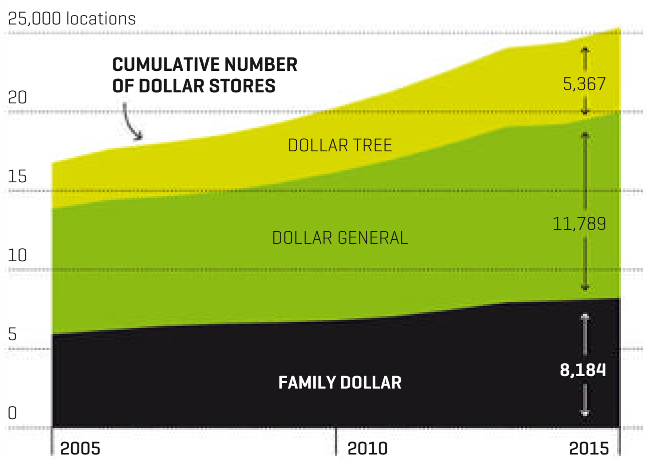
Other activist billionaires were already circling, squaring off in what became an epic, 18-month war—one that has only recently drawn to a close. As *Fortune* went to press in late April, the smaller Dollar Tree chain was close to completing a $9.1 billion acquisition of Family Dollar. To make the deal happen, the two discount retailers had to fend off a no-holds-barred, last-minute assault from Dollar General and contend with a host of the most demanding investors—and biggest egos—on Wall Street.

The merger battle over Family Dollar was a veritable activists' brawl, pitting many of the boldest names in finance against one another. Among the titans vying for profits in the contest were Nelson Peltz of $15 billion Trian Fund Management, John Paulson of $18 billion Paulson & Co., Larry Robbins of $22 billion Glenview Capital, and Paul Singer of $23 billion Elliott Management, with a cameo appearance from Icahn protégé Keith Meister of $11 billion Corvex Management. It is more than a little ironic that in an era in which hedge funds are on the rampage, attacking bigger and bigger targets—think of Icahn's successful campaign to get Apple to return more cash to shareholders, or Peltz's current offensive against DuPont—perhaps the most hotly contested activist war of the new millennium was waged over a retailer that sells 99¢ toothbrushes and $2 detergent to America's poorest customers.

For all their sway, the activists revealed plenty of their own imperfections in this saga—and a striking ability to recover from them. Icahn initially backed what became the losing bidder. But through an amazing blend of quicksilver timing, canny button pushing, and a little luck, he proved one of the biggest beneficiaries, collecting a $265.8 million profit in just a few weeks. Similarly, Trian tripped up more than once—but also cashed in big. (For more on the fallibility of hedge funds that agitate for corporate change, see "Actively Mediocre" in Macro.) Whether

DOLLAR STORES ARE EXPANDING ...

The past decade has not been a good one for the U.S. middle class by many metrics, but discount stores have been the beneficiary: Cumulative store growth has been about 50% during that time.



NOTE: VALUES AS OF FISCAL YEAR-ENDS. GRAPHIC SOURCE: THE COMPANIES

the activists succeed or fail, one lesson is inescapable today: If you're a CEO, you have to deal with them.

All the maneuvering, in the end, led to an unexpected result: The upstart Dollar Tree is set to emerge from the merger as a new powerhouse. With some $20 billion in revenue and around 13,000 stores, it will narrowly surpass Dollar General to become the largest dollar chain and an important alternative to Wal-Mart for millions of bargain-seeking shoppers.

Through interviews with Icahn, Levine, and other key players, as well as legal documents, *Fortune* was able to assemble a picture filled with new and surprising details. The public twists and turns of the contest have been well covered, but the full behind-the-scenes story of how the dollar-store war was won hasn't been told until now.

THE DOLLAR CHAINS ORIGINATED IN 1955, when the father-and-son team of J.L. and Cal Turner opened the first Dollar General in Springville, Ky., selling everything for $1 or less. (Today the company is based in Goodlettsville, Tenn., a Nashville suburb.) Four years later Howard Levine's father, Leon, pondered procuring a Dollar General franchise, but instead invested $6,000 to open his own dollar emporium in Charlotte.

Though they're called "dollar" stores, today the two biggest players, Dollar General and Family Dollar, sell goods at a range of prices, usually between $1 and $20. The customers, mainly women who head households, typically pick up just a couple of items—for example, toilet paper and a six-pack of Coke—between big weekly trips to a Kroger or Wal-Mart. For decades Dollar General and Family Dollar have been the Coke and Pepsi of the industry. They sell mostly the same products and are often down the street from each other, in rural towns and low-income areas of big cities. The much smaller Dollar Tree, with headquarters in Chesapeake, Va., came along later, in 1986. It retains the original approach: All items are priced at $1 or less.

It was the financial crisis that brought boom times to the dollar-store industry. The brutal recession and its aftermath attracted tens of millions of new customers in search of bargain prices on household essentials. The three chains each began adding hundreds of new locations annually. Since the end of 2005, the total number of Dollar General, Family Dollar, and Dollar Tree stores has leaped by some 50%, from 16,753 to 25,340.

That explosive growth, inevitably, attracted major attention from Wall Street. A pivotal point came in 2007 when KKR purchased Dollar General in a leveraged buyout. The team that runs it to this day, led by CEO Rick Dreiling, took Dollar General public again in 2009 and proved to be brilliant operators, driving margins and sales per square foot to among the best of any discount retailer.

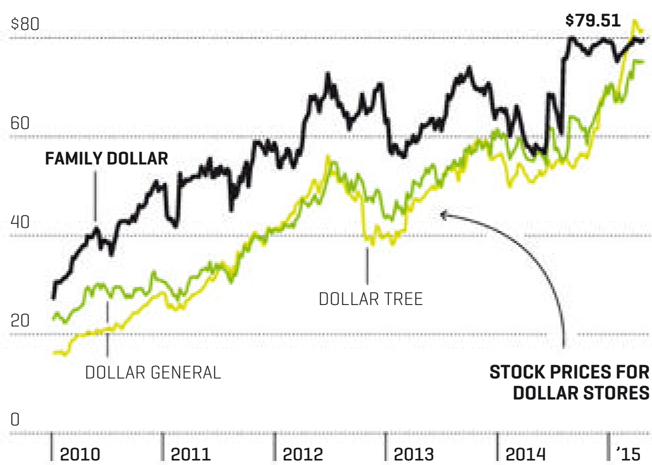
It was Dollar General's fantastic performance and the big returns it produced for KKR that attracted Trian. Peltz and his partner Ed Garden, who also happens to be Peltz's son-in-law, saw lots of unfulfilled potential in Family Dollar. Although its numbers looked good compared with those of most retailers, its margins and sales per store were trailing Dollar General's, and the gap was widening. Wall Street regarded Levine, who'd inherited the CEO post from his father in 1998, as a mediocre CEO. Peltz and Garden thought they were just the ones to lift Family Dollar to the best-in-class standards established by its larger rival. "We thought we could close the gap," says Garden. "That was the main attraction." They bought a stake of about 8% in the company in 2010.

Peltz and Garden had good reason to believe in their own ability. Garden, 53, had joined with Peltz and Peltz's partner of more than 30 years, Peter May, to start a hedge fund in 2005. That move created one of the biggest forces in activism. Peltz and May were expert at fixing companies but lacked the capital to do big deals. Raising funds from institutions gave them the cash to enter the top tier of activists. In contrast to Peltz, 72, a gravelly voiced, larger-than-life figure and instinctive investor, Garden is a calm, analytical numbers man who describes himself as a "purely economic animal." The Trian team has a strong record of improving operations at companies in which it invests and serves on the board, including ketchup maker Heinz, mutual fund company Legg Mason, and fast-food chain Wendy's. Trian specializes in what it calls "operational activism." It works with existing management to boost day-to-day efficiency, dispatching teams of experts to help improve performance.

But in the case of Family Dollar, the Trian approach failed to reach its operating goals. In spite of Trian's efforts, things just kept deteriorating. If not for a surprising takeover bid by Dollar Tree at a critical moment, Family Dollar might have

AND THEIR STOCKS ARE SOARING

Even during a period of surging share prices—the S&P 500 has risen nearly 100% since January 2010—dollar-store stocks have far surpassed the broader market.



GRAPHIC SOURCE: S&P CAPITAL IQ

become a big failure for Trian instead of another triumph.

By the numbers alone, Family Dollar looked like an easy win to Garden. He figured that adding operational improvement to Family Dollar's low valuation would spark strong returns. In 2011, Trian bid to purchase the company outright. Its board declined, but the two sides quickly reached a compromise: Garden would join the board, and Family Dollar would adopt a fresh operating plan.

GARDEN'S EXPECTATIONS about Family Dollar's returns didn't come true. A new president and COO, former pharmacy executive Michael Bloom, was brought in. He attempted to increase traffic and lure more middle-class customers by following the drugstore industry's formula of offering lots of promotions advertised with fliers. One week Family Dollar would post great prices on detergent and garbage bags; a few weeks later it would tout promotions on paper towels and toothpaste. Meanwhile it raised prices on staples. The approach backfired. Family Dollar's core customers wanted consistent and predictable prices on their household essentials. By contrast, Dollar General stuck with a Wal-Mart-esque "everyday low prices" approach. More and more Family Dollar regulars began crossing the street to shop at Dollar General.

It's hard to pin the retailer's problems solely on Bloom. Levine was still CEO—he had designated Bloom his eventual successor—and Family Dollar critics say that Bloom never had the freedom to fully run the business. As a board member, Garden signed off on the strategy. Family Dollar is also known for being tightfisted, and Bloom may have been limited in his ability to pay to attract talent. (Bloom did not respond to *Fortune*'s request for comment.)

By early 2013 the thriving dollar market was beginning to slow down, and the leading sufferer was Family Dollar. "We were opening hundreds of stores a year, yet EBIT was flat," says Garden. Adds Levine: "It was clear we'd lost our way." Garden began thinking that the best course might be a sale. Family Dollar was collecting just $180 in sales per square foot annually in its stores, compared with $230 at Dollar General. If the company went on the block, the most obvious buyer would be Dollar General. "I thought that Dollar General could pay a big price, because their great management could bring their metrics to Family Dollar," explains Garden.

On April 16, 2013, Garden invited Levine to dinner at Aretsky's Patroon, a Midtown Manhattan restaurant that's a favorite of the three Trian partners. The private space was cramped. "It was like dining in a closet," recalls Levine. Garden told Levine that though he wasn't giving up on the revival plan, it wasn't working well, and Levine needed to explore a sale. "He never pushed back on that option," says Garden. From the evening of their dinner, says Garden, Levine skillfully represented stockholders—of which Levine himself was one of the largest—at first by aggressively pursuing a deal with Dollar General.

Levine had reason to think Dollar General might be interested. In late February, Michael Calbert, Dollar General's lead director, had called Levine to arrange a meeting. As a KKR partner, Calbert had spearheaded the Dollar General purchase, one of the most successful retail buyouts of the past decade. During their meeting, in a suite at the Ritz-Carlton Hotel in Charlotte, the two discussed a possible merger, and Calbert asked how long Levine planned to remain CEO. Levine responded that even if Dollar General bought Family Dollar, he would want to run the combined companies as CEO. Calbert warned that the Dollar General board would never agree to that.

According to Garden, he was the one who had advised Levine to demand that condition, but strictly as a negotiating tactic. "It was an easy 'give,'" says Garden. "We'd exchange that requirement for a higher price." Dollar General would later use Levine's demands to claim that the Family Dollar CEO was driven by ego and that he placed his own desire for power over the interests of shareholders.

After the pivotal session at Patroon, Levine began ardently courting Dollar General. After Levine called repeatedly, Calbert and Dollar General CEO Dreiling invited Levine to meet at the historic Hermitage Hotel in Nashville, near Dollar General's headquarters, on Oct. 15, 2013. Levine repeated his desire to serve as CEO following a merger. When Dreiling and Calbert objected, Levine, in his own words, "dropped those demands pretty dramatically." Using the Garden playbook, he stated that putting Dollar General management in charge was no problem, as long as it paid a large premium.

CARL ICAHN

When Family Dollar's CEO tried to explain his weak earnings, Icahn cut him off. "Stop making excuses!" said the billionaire hedge fund king. "Tell it to your mother."

ICAHN: HEIDI GUTMAN/CNBC/NBCU PHOTO BANK

According to Levine, Dreiling appeared willing and enthusiastic about running a Dollar General/Family Dollar combination. "I'm a young 60," he said, adding that he would remain in charge for a merger and lead the integration process that would follow.

For Levine and Garden the Nashville meeting raised hopes that Dollar General wanted a deal. Both sides agreed that Dollar General could hugely improve Family Dollar's performance, potentially generating big returns for its shareholders. "I felt some excitement about a merger," says Levine. "We believed that Dollar General was ready to deal." But to the surprise of Levine and Garden,

THREE FOR A DOLLAR

Dollar General is the oldest and largest of the three dollar-store chains, but the merger of Dollar Tree and Family Dollar will create an even larger retailer, with a market value of around $25 billion.

DOLLAR GENERAL

CEO:
Rick Dreiling

Headquarters:
Goodlettsville, Tenn.

Market value:
$23 billion

Market:
Oldest of the chains is located mainly in rural and low-income urban areas in 43 states. Household "fill-in" items typically sell for $1 to $10.

DOLLAR TREE

CEO:
Bob Sasser

Headquarters:
Chesapeake, Va.

Market cap:
$16 billion

Market:
Unlike its rivals, it locates stores mainly in suburban areas and prices all items for $1 or less.

FAMILY DOLLAR

CEO:
Howard Levine

Headquarters:
Matthews, N.C.

Market cap:
$9 billion

Market:
Competes with Dollar General for local customers in small towns and urban areas, with most items priced under $10.

ALL PHOTOS VIA GETTY IMAGES

Dollar General didn't follow up. Instead, Levine remained in the uncomfortable role of suitor. He kept calling Dollar General to arrange another meeting. Dreiling and Calbert yawned, first agreeing to meet in November, then canceling that meeting and another set for January. It was "unbecoming how desperate we looked to do a transaction with them," says Garden. "They kept saying, 'We think it could be interesting. Let's meet in a few months. We aren't interested at this point.'"

By December, Garden and Levine had become convinced that Dollar General was hoping to string Family Dollar along and buy it in distress—and far below its price then of around $55 per share. So Garden pressed the Family Dollar board to explore two main options: a sale to another acquirer, and a standalone plan in case no buyer emerged. At what Garden calls a "come to Jesus" board meeting in January 2014, the directors established a committee of four, including Garden, and hired Morgan Stanley to make a list of possible buyers. They also made some strategic changes. Bloom departed, and Family Dollar restored its traditional everyday-low-price policy. The company pledged to close 375 underperforming stores, ending years of rapid expansion.

Family Dollar's acquisition options appeared bleak. An LBO was a long shot because few private equity firms could raise the $8 billion–plus required. The only likely retail buyer was the one that had apparently walked away: Dollar General. The most probable scenario was that Family Dollar would muddle along as an independent enterprise. It faced a future as an underachiever: For the six months ended March 1, 2014, its profits dropped 23%, and its margins stood at 5%—four points below Dollar General's—and not improving.

But in mid-March a near miracle occurred. Bob Sasser, Dollar Tree's CEO, requested a meeting with Levine, saying his company was extremely interested in buying Family Dollar. Dollar Tree was the unlikeliest of buyers. Though extremely well run, it had half as many stores as Family Dollar—5,000 vs. 8,200—and had never acquired more than 1,000 stores. Its locations were situated in suburban markets, catering to middle-class bargain hunters rather than low-income shoppers.

In early April the two companies signed a nondisclosure agreement swearing both sides to secrecy while Dollar Tree studied Family Dollar's books. On May 14, Sasser offered between $68 and $70 a share for Family Dollar, depending on the exact terms of the deal. The Family Dollar board declined, demanding a higher bid. But $70 was already far above the then-price of around $55—a figure that itself was already inflated by speculation that Dollar General was in the hunt. By early June, Garden and Levine reckoned that a deal was close at hand.

Then Hurricane Carl struck. On June 6, Icahn announced his 9.4% position in Family Dollar. He immediately called Levine. "It was a Friday afternoon," recalls Levine. "He wasn't calling to wish me a good day. In fact, it might be interpreted as the opposite." News of Icahn's involvement boosted Family Dollar's stock 13.4% in a single day, to more than $68 per share. Within hours, Icahn, who had bought his shares at an average price of $57, was sitting on a gigantic profit, which would be locked in as soon as Dollar Tree and Family Dollar announced a merger agreement. He just didn't know it. And the nondisclosure agreement barred Levine from telling him.

At their dinner in New York, Levine asked Icahn whether he'd be willing to sign a nondisclosure agreement, lasting one year, that would ban him from buying more shares or brokering

a sale. Icahn refused. Instead, he demanded the right to name three directors who would arrange a sale to a buyer, most likely Dollar General. If Levine refused, Icahn pledged to remove the entire board. "At dinner Levine kept telling me about all these great things he was doing, like adding coolers and selling alcohol," says Icahn. "You have to be something of a psychiatrist in this business. I read it that Levine never really wanted to go, that he wanted to keep running the company. In my humble opinion, if I'd signed that nondisclosure, he'd have found a way not to do the Dollar Tree deal." Nor did Icahn take kindly to the poison pill that Family Dollar had adopted to prevent him from buying more shares. "It's like a guy in a bar who slaps you in the face, then wants to be friends," says Icahn.

Levine and Garden, meanwhile, were concerned that Icahn's presence could cause the existing deal to fall apart. Family Dollar had lucked out with Dollar Tree. The fear was that Icahn would push aggressively for board changes and that Dollar Tree could be talking to an entirely new set of directors in 45 to 60 days. "And here we are with a near bird-in-the-hand, on the verge of a deal with Dollar Tree!" says Garden. "We didn't want anything to derail it."

Suddenly Dollar General reappeared. Just after the Icahn announcement, Calbert called Levine to suggest a meeting. By now Levine had become concerned that a Dollar General/Family Dollar tie-up might pose serious antitrust risks. Starting in early 2014, attorneys from Cleary Gottlieb Steen & Hamilton had been presenting alarming regulatory scenarios for a combination with Dollar General. In an email to Calbert, Levine proposed that the lawyers from both companies meet to discuss the competition issues and what requirements the Federal Trade Commission might impose to approve a merger.

Calbert apparently viewed the risks as easily manageable. He declined, writing Levine that "getting outside counsel going on antitrust is a bit premature." (Dollar General did not make its executives available for interviews.) As it turned out, the antitrust hurdles that had given pause to Levine and Garden would become the defining issue of the dollar-store war and the one that would decide its outcome.

THOUGH THE TWO SIDES couldn't agree on the urgency of antitrust, Family Dollar and Dollar General did arrange a crucial summit for June 19, 2014. What each side hinted, implied, and hid at that meeting would become a subject of dispute in the months to come. According to Family Dollar, Levine was highly restricted by the confidentiality agreement with Dollar Tree. It barred Levine not just from disclosing that he was negotiating with Dollar Tree, but also from even saying that he was talking to any buyer, named or not. Levine and Garden wanted to keep the deal secret. They feared that if Dollar General found out, it might bid for Dollar Tree instead, and leave Family Dollar an endangered orphan. "We didn't know what advice Dollar General was getting on antitrust risk," says Garden. If it thought it would have problems buying Family Dollar, Garden and Levine anticipated, it could bid for Dollar Tree instead, forging an accord with few regulatory issues. In the process it would destroy the Family Dollar/Dollar Tree merger, and leave its biggest competitor in a difficult position.

ED GARDEN

Family Dollar investor and board member Garden ardently pursued a takeover by Dollar General. It was "unbecoming how desperate we looked."

Nevertheless, the board wanted one last chance at getting a big offer from Dollar General. "The synergies were so tremendous that we knew they could pay a good price," says Garden. He and Levine had also become convinced that Dollar Tree would keep bidding if Dollar General entered the fray.

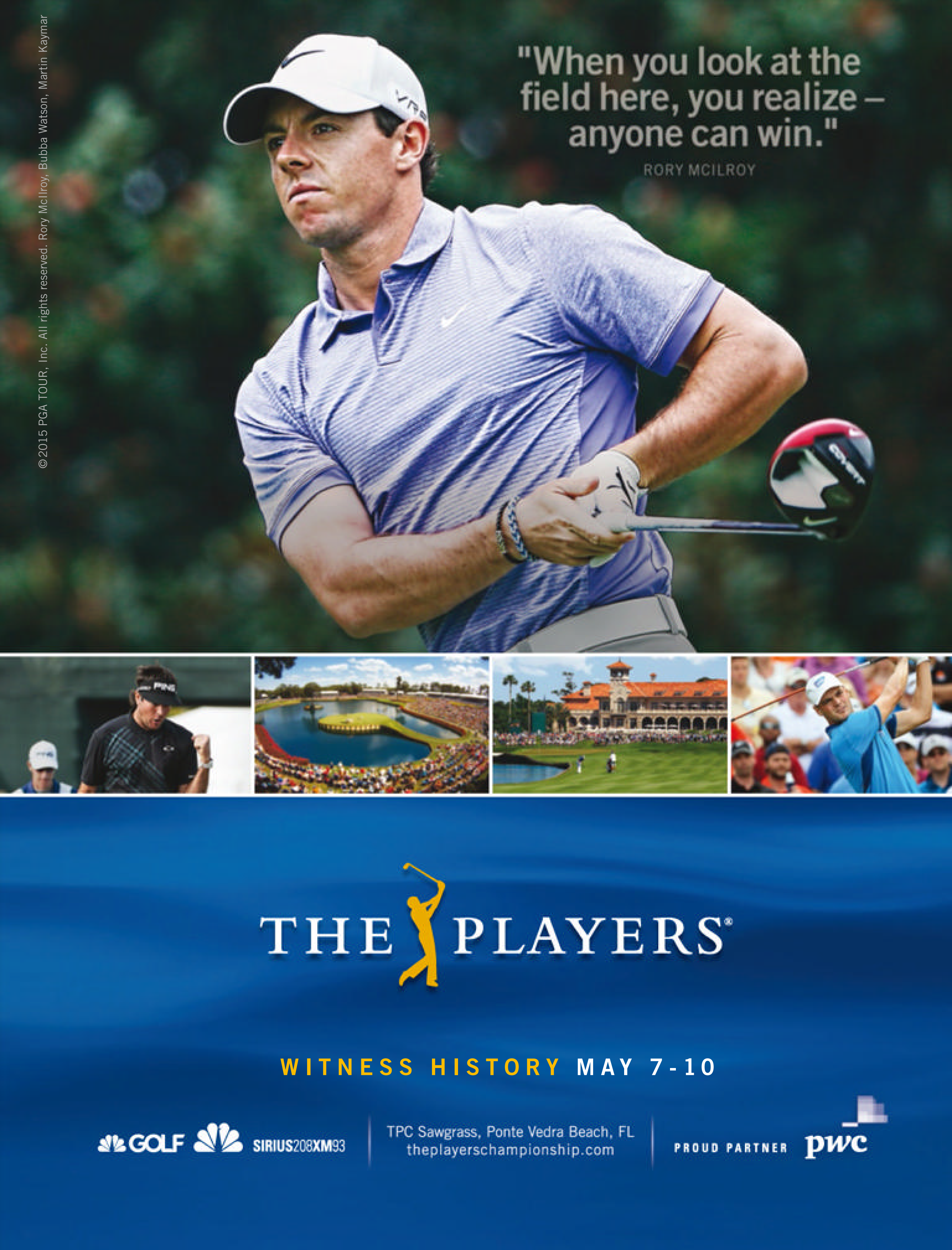
On June 13, undeterred by Icahn's announcement, Dollar Tree raised its offer to $72. "It appeared that the deal was far enough along that Dollar Tree would stay in," says Garden, "even if they had to bid against Dollar General." Adds Levine: "I got from the beginning that they really wanted to do a deal. Despite what they saw as all the complications gumming up the works, they stuck to it."

The Family Dollar executives met with their peers from Dollar General in a private dining room at a Charlotte country club where Levine plays golf. "It was like a shivah call or a wake," Levine says. "They kept saying how sorry they were about Carl, as if they were offering condolences."

Dreiling and Calbert told Levine that though they were interested, the time wasn't right for a merger. They acknowledged that their own shareholders were pushing for a deal. A big problem, they argued, was Family Dollar's high stock price, boosted by speculation about a deal with Dollar General, as well as the Icahn surprise. According to Family Dollar, Calbert said Dollar General might take steps to take the froth out of Family Dollar's stock by publicly declaring that it wasn't interested in buying the company. Or perhaps it would announce a big share buyback that would reduce the capital it would have available for an acquisition, quelling merger speculation. Dollar General has never confirmed or denied those alleged statements.

At one point Levine revealed that Icahn had mentioned another, unspecified potential buyer. Levine said that, though he wasn't sure, he thought Icahn was talking about Dollar Tree. Dreiling dismissed the idea, saying it lacked the financial strength to buy Family Dollar. Before the meeting ended, Calbert asked Levine what he would recommend they do. "I'm embarrassed. I feel like

GARDEN: COURTESY OF TRIAN PARTNERS



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I'm being desperate," said Levine, according to his subsequent deposition, "but you should make an offer."

After the meeting Family Dollar pondered writing a letter of complaint—known as a "Bed Bug Letter"—to the SEC, questioning whether the moves that Dollar General suggested to deflate Family Dollar's share price would amount to stock manipulation. (It's unclear whether Family Dollar ever sent such a letter.)

As usual, no Dollar General bid was forthcoming. On June 20, Sasser raised his bid to $74.50, and shortly thereafter the Family Dollar board accepted. The agreement negotiated over the next few weeks bound Dollar Tree to purchase Family Dollar, with no shareholder vote required. That provision virtually guaranteed the merger would close. If Dollar General bid for Dollar Tree, it would now have to buy both Dollar Tree and Family Dollar. Given the immense size of that transaction, a merger between Dollar General and Dollar Tree became a virtual impossibility. On the other hand, Family Dollar reserved the right to accept a superior offer from another bidder. So an avenue remained for Dollar General to trump Dollar Tree.

A week later Dollar General announced that Dreiling would retire by the following May at the latest. To Levine and Garden the imminent departure of the successful CEO, who'd described himself to them as a "young 60," was a shock. They, like most of Wall Street, thought that a new CEO wouldn't tackle such a transformative deal. Now a deal with Dollar General increasingly looked like a long shot.

Indeed, Family Dollar's stock languished just after the announcement. A source close to Dollar General, however, says that its motivation was just the opposite. Thinking they had plenty of time to buy Family Dollar, the board wanted to choose a new CEO who could negotiate the deal and see it through full integration, a process that might last many months.

The Dreiling news discouraged even Icahn. "It's obviously disappointing that you have a very good CEO at Dollar General that's leaving and that might throw a monkey wrench into a merger there," he declared on CNBC. He continued to trash Levine, stating on CNBC that he "shouldn't be CEO." As he told *Fortune*, Icahn planned to eventually bid for Family Dollar if Dollar General stayed on the sidelines. He was confident his offer would have forced Dollar General to finally make its move, and outbid him in the process. "That's how much they wanted it," he says.

As it turned out, it was the Dollar Tree deal that finally roused Dollar General. Dollar General's leaders were absolutely astounded by the news. Now the chance of buying Family Dollar at a distressed price was gone. Still, investors such as Keith Meister, who owned Dollar General stock, and John Paulson, who held positions in both companies, exhorted them to make a bid.

On Aug. 18, 2014, Dollar General announced an offer for $78.50—leapfrogging Dollar Tree's bid. In a letter to Levine, Dreiling said he was "surprised and disappointed to find out about" the Dollar Tree deal and accused Levine of unfairly hiding that the Dollar Tree pact was imminent. As part of the campaign, Dreiling announced he was effectively "un-retiring," and would stay on as CEO until the middle of 2016 to oversee the integration of Dollar General and Family Dollar if a deal was reached.

Dollar General then went after Levine. Referencing the Family Dollar CEO's earlier demand to retain control if the two companies merged, Dollar General argued that it was presenting a better proposal to Family Dollar's shareholders, "although perhaps not for Mr. Levine personally."

The Family Dollar board shocked many investors by rejecting the $78.50 bid from Dollar General and on Sept. 5 spurned another offer for $80. That bid represented an extra $600 million to shareholders. So why would any board reject an offer that, at least on paper, looked so much better? For weeks that's the question activists kept throwing at Family Dollar. But the board's decision made sense. Though the Dollar General deal looked richer, the chances it could actually buy Family Dollar looked low because of antitrust concerns—while the Dollar Tree deal was a sure thing.

The previous May, Family Dollar's lawyers at Cleary Gottlieb had told the board that a combined Dollar General/Family Dollar would need to divest several thousand stores to win clearance from the Federal Trade Commission. Yet in its merger proposal, Dollar General offered to shed just 700 stores, later raising the ceiling to 1,500. Cleary Gottlieb estimated that the 1,500 limit gave the merger just a 40% chance of winning approval. As a result, Family Dollar refused to engage in negotiations with Dollar General, since the board found its offer highly unlikely to close. The 1,500-store limit, says Garden, "made me more skeptical about their intentions, since they have very sophisticated lawyers."

As it turned out, the Cleary analysis was correct. The firm accurately predicted the methodology the FTC would use to reach the crucial divestiture number. As Cleary forecast, the FTC looked at the competition between dis-

HOWARD LEVINE

"It was like a shivah call or a wake," says Family Dollar CEO Levine of his meeting with rival execs after Icahn bought stock in his company. "They kept saying how sorry they were about Carl."

LEVINE: T. ORTEGA GAINES—THE CHARLOTTE OBSERVER

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counters in thousands of markets where Dollar General and Family Dollar compete. Dollar General argued that Family Dollar's pricing had no influence on its own pricing strategy. Instead, Dollar General maintained that it used Wal-Mart as its primary benchmark.

The FTC didn't see it that way. It determined that in markets where Family Dollar and Dollar General competed, Family Dollar prices were lower than when Wal-Mart was the main competition. As a result, the FTC feared that the prices of today's Family Dollar stores would rise if they came under the same ownership as Dollar General.

When Family Dollar stood firm, Dollar General announced it was taking the fight directly to Family Dollar's shareholders by launching a tender offer at $80. That was theater. Regulations governing tender offers bar a bidder from purchasing shares before receiving antitrust approval. Still, Dollar General had a lever for destroying the Dollar Tree deal and perhaps winning Family Dollar for itself; that opportunity was to persuade the activists and other big shareholders to vote down the Family Dollar/Dollar Tree merger, scheduled for Dec. 23.

Indeed, some activists were furious with Family Dollar. Its stock was trading well above Dollar Tree's $76.50 offer, meaning that most investors thought Dollar General would win. Proxy advisory firms Glass Lewis and ISS both recommended that Family Dollar shareholders vote against the Dollar Tree merger and force Family Dollar to also negotiate with Dollar General. (Glass Lewis and ISS later changed their positions.)

In mid-October, Elliott Management announced that it had purchased 4.9% of Family Dollar shares and launched a proxy battle to force Family Dollar to enter into negotiations with Dollar General. Elliott was so confident of success that it purchased its shares in the high-70s. By mid-December, Dollar General had gained strong support for its higher bid, and it looked as though Family Dollar would lose the shareholder vote. "They were kicking our butt," says one participant.

The risks of a loss were great. If Dollar Tree disappeared and Dollar General failed to win antitrust approval, the market would once again value Family Dollar as a struggling standalone. Its stock might be worth $35 or $40, a loss of half its value.

To win over investors, Levine, Garden, and Brian Byrne, an attorney for Cleary Gottlieb, embarked on a road show to convince the activists and big institutions that the Dollar General bid was likely to fail despite the higher price. In the meetings Garden's status as a fellow activist and big shareholder was crucial. He emphasized his stance as an "economic animal," stressing that shareholders should take not the highest price but "the highest price with certainty." The team found a ready listener in Paulson. "Paulson got it quick," says Levine. Informed that even the Dol-

lar Tree deal was taking months to review, Paulson said, “Then imagine what’s going to happen with Dollar General!” Unable to secure the necessary votes by Dec. 23, Family Dollar secured a postponement until Jan. 22, 2015.

The road show won over many investors. But even in mid-January, Family Dollar still wasn’t sure of victory. In most deals the FTC declines to give any indication of what its analysis is showing before it reaches a final decision. But Cleary Gottlieb convinced the FTC lawyers that a landmark shareholder vote depended on their numbers. The FTC attorneys even agreed to read, and tacitly approve, a highly detailed press release from Family Dollar stating that the FTC found that prices would rise at Family Dollar stores in thousands of markets in the absence of an independent Dollar General outlet in the same neighborhood. Family Dollar believed that Dollar General was getting similar feedback from the FTC but not disclosing it. So it sent a letter to the SEC urging the agency to compel Dollar General to reveal the status of its talks. On Friday, Jan. 9, the SEC wrote a letter to Dollar General requiring it to disclose any updates, good or bad, from the FTC.

THE DECISIVE STROKE CAME THE NEXT DAY. A lead FTC attorney set times for Family Dollar and Dollar General to place separate calls in the early evening. Around 6 p.m., lawyers from Cleary placed the first call. The FTC lawyer said that between them, Family Dollar and Dollar General would need to divest between 3,500 and 4,000 stores to secure the FTC’s approval. Minutes later Dollar General received the same news. In effect, the regulators would require that Dollar General sell the equivalent of as many as half the stores it was buying, probably at fire-sale prices. That was clearly a dealbreaker.

The following Wednesday, Dollar General essentially conceded defeat (but still assailed the FTC for relying “heavily on an untested theoretical model”). On Jan. 22, Family Dollar’s shareholders voted overwhelmingly to approve the merger with Dollar Tree. When the deal closes, Levine will pocket around $700 million, while Trian books a profit of around $400 million.

Despite the defeat, Dollar General just might salvage something from the dollar-store war. The FTC will require that Family Dollar and Dollar Tree sell some 300 stores to win approval. Somebody in the discount retail business will buy them. Would it be completely outrageous to predict that that someone will be Dollar General?

Icahn’s postmortem is instructive. “Dollar General should have bid much earlier,” he says. “Once I got in, Family Dollar was in play. The chance that Dollar General could get it cheap was gone.” Just like dollar-store shoppers, Icahn knows to grab a bargain when he sees it.

MODEL	ARMATIX iP1 PERSONALIZED
AMMUNITION	.22 caliber
PRICE	$1,798
SUMMARY	The first smart handgun available on the market. Uses RFID technology to ensure that only an authorized user can fire it.

SMART GUNS:

They're ready. Are we?

THE TECHNOLOGY IS AVAILABLE TO LIMIT THE NUMBER OF CHILDREN WHO PERISH IN GUN ACCIDENTS. THAT WAS THE EASY PART.

Doug, who runs the website smartgunz.com, asks us not to use his last name or to identify the town where he works. "I'm just in Nebraska," he says.

By ROGER PARLOFF

PHOTOGRAPH BY IAN ALLEN

"What's on the website," he continues, "that's the information that can be given out. I just want to see where it's going to go. Take baby steps. Move forward as it progresses."

A lifetime National Rifle Association member, Doug earns his living as a gunsmith and licensed firearms dealer, selling pistols, revolvers, assault rifles, and machine guns to law enforcement and other qualified customers.

That's all ho-hum. But smartgunz.com is sensitive stuff, so Doug wants to insulate his mainstream business from it.

Is he dealing in contraband? Peddling vice?

No. Doug is selling the Armatix iP1, a semiautomatic pistol developed by the renowned weapons designer and executive Ernst Mauch. During his more than 30 years with his prior employer, Germany's Heckler & Koch, Mauch oversaw development of modern versions of the MP5 submachine gun, used by the FBI; the G36 assault rifle, used by numerous police forces; the GMG, a 40mm grenade machine gun used by about a dozen NATO armies; the Mark 23 pistol, used by U.S. Special Operations Forces and described by *Small Arms Review* as "the most reliable and accurate service pistol ever created"; and the HK416 assault rifle, reportedly used by a Navy SEAL to kill Osama bin Laden.

But Mauch's iP1 pistol comes with a feature that's found on no other weapon being sold in the world today. It's supposed to prevent the gun from firing when anyone other than the owner—a child, say—pulls the trigger.

And that's why Doug has to be so hush-hush. If his last name were made public, people would try to put him out of business and, perhaps, threaten to kill him. That's what happened to the last two gun dealers who tried to sell this gun.

The iP1 is a so-called smart gun, also known as a "personalized" or "authorized-user-recognition" weapon. It shoots only if it is within 10 inches of a special watch, activated by the user with a five-digit PIN code for a set period—up to eight hours. The watch, which takes less than a half-second to activate, contains an RFID transponder, whose signal is recognized by a receiver inside the gun, which then unblocks the firing pin. (Doug sells the gun over the Internet to other licensed gun dealers, who can then resell it to retail customers in accordance with state law. He won't say how many he's sold, but he confirms he has sold some.)

Though no other smart gun is as far along as the iP1, there are a host of others in development. Some employ RFID, others use biometric sensors (like fingerprint readers), while still others are working on grip-recognition approaches—like the fictional gun James Bond used in the movie *Skyfall*.

A properly functioning smart gun holds out the prospect

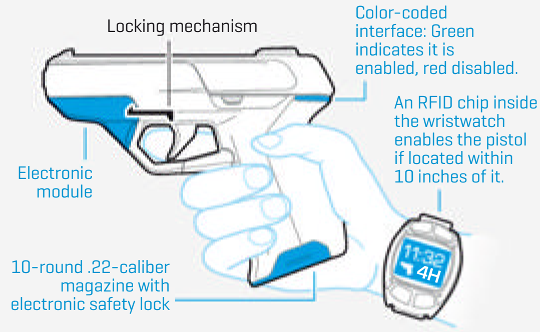
HOW TO BUILD A SMARTER GUN

Here are examples of the three main approaches now being explored.

1. RFID

The gun can't be fired beyond a specified distance from an RFID watch, ring, or bracelet.

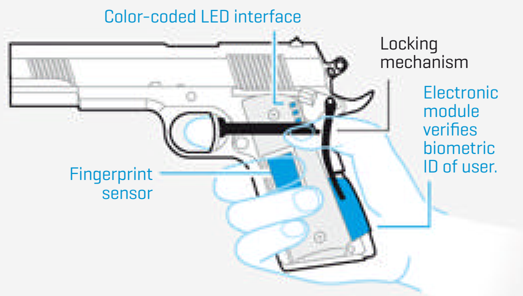
ARMATIX iP1 — AVAILABLE NOW



2. Biometric

The gun can't be fired without recognizing a given fingerprint or palm print.

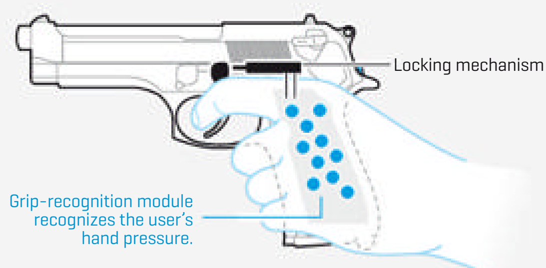
KODIAK ARMS INTELLIGUN — COMPANY TAKING PRE-ORDERS



3. Grip Recognition

The gun is "trained" to detect the unique pressure points of the owner's grip.

N.J. INST. OF TECH./ALLIED BIOMETRIX — STILL IN THE LAB



of eradicating, like smallpox, those unbearable horror stories we still come across about twice a month. Like the one last December, in which a 2-year-old at an Idaho Wal-Mart reached into his mom's purse, pulled out her pistol, and shot her to death. (In 2010, 62 children, age 14 or younger, died in gun-related accidents, including 25 under the age of 5, according to the National Safety Council.)

Additionally, the hope is that smart guns could reduce the toll of murdered police officers, killed when their service revolvers are wrested away from them. (From 2004 to 2013, according to FBI statistics, 33 police officers were murdered with their own weapons.)

Likewise, some of the hundreds of despondent adolescents who use others' guns to commit suicide each year—about 670 of them in 2010—might be foiled long enough to find treatment. Criminals who steal handguns would make off with scrap metal. In theory, such technology could even keep U.S. military weapons from being used against us: If captured by enemy forces, the arms could be deauthorized and turn themselves off.

All intriguing prospects. So why would anyone try to put Doug out of business?

Well, there are some antigun groups that oppose smart guns for the same reason they oppose all guns. But they're not the problem.

DANIEL MAYER

Renowned gun designer and executive Ernst Mauch holds his smart-gun creation, the .22-caliber iP1.

The problem arises, rather, from gun enthusiasts themselves, many of whom fear that smart guns are a step toward gun control, that the technologies are intrinsically unreliable, and that they are being foisted upon gun owners by ignorant do-gooders who aim to ban all guns that lack these features.

Such concerns are not pure paranoia. Some people really would like to make these guns mandatory. There are also some genuine technological hurdles to be overcome and some reasonable qualms to be set at rest. For a fingerprint-reading gun, can it be made to work with blood, mud, or gloves on your hands? For an RFID gun, like the iP1, what happens if you lose the watch, or an assailant grabs it away? For any smart gun, what happens if the batteries run out? And just how superior are smart guns to old-fashioned gun locks?

Officially, neither the National Rifle Association nor the main trade group for the domestic firearm industry, the National Shooting Sports Foundation, opposes smart guns. They oppose only "mandates," each asserts—though it can sometimes be hard to tell from their rhetoric.

"Groups with no technical knowledge and who have a political agenda view this technology as a panacea," says Larry Keane, general counsel of the NSSF. "It's not as simple as they would like to make it," he says. "There are significant chal-

ILLUSTRATIONS BY NICOLAS RAPP

lenges with marrying electronics and firearms. A gunshot generates a lot of energy and vibration. Guns require lubricants and solvents, which are hell on electronics."

But resistance to smart guns clearly extends beyond technical issues. The most formidable opponent might be Keane's client, the American gun industry. It's a fairly small, low-margin business whose participants haven't historically had to invest much in capital expenditures. The most popular pistols today are variants of one designed for Colt's Manufacturing by John Browning in 1911. The entire industry generates about $8 billion in sales annually, which would place it 338th among the *Fortune* 500 if it were a company, about even with medical device maker Becton Dickinson. The largest handgun manufacturers, Sturm, Ruger, of Southport, Conn., and Smith & Wesson, of Springfield, Mass., had net sales of just $544 million and $627 million, respectively, in their latest fiscal years. For companies like these to shift to digital technologies would entail major financial upheaval.

Trade group reps, in fact, often speak as if no safer gun could possibly exist than those now in circulation. "A product that does exactly what it's supposed to do, every time you do it, is safe," proclaims Richard Patterson, the director of the manufacturer-run standards organization SAAMI (the Sporting Arms and Ammunition Manufacturers' Institute). "It goes bang—not click, not boom. There are other people who define safety as a firearm that never goes bang."

Gun trade group representatives also demean the iP1's allegedly modest lethality. "That caliber is typically used for target shooting, plinking, and small game like squirrels," says Keane, referring to the .22-caliber ammo it shoots. But Armatix has a 9mm pistol in the pipeline, the most popular pistol-bore size in the U.S., and one used by many police departments. That model, the iP9, is being designed to meet police and military specifications and should be available for evaluation by those forces later this year. If Armatix can persuade such a unit to adopt the iP9, the world will change.

"I've never been more optimistic about personalized guns than I am now," says Stephen Teret, the founding director of the Johns Hopkins University Center for Gun Policy and Research, who has been pushing for safer gun designs for more than 30 years. "It's going to happen. And the American gun companies can either get on board or they can become Kodak."

IN 2000, A PRODUCT-LIABILITY suit was filed in Pittsburgh against the German gunmaker Heckler & Koch. A teenager accidentally killed his friend, another teen, with his father's H&K P7 pistol. Ernst Mauch, then head of H&K's technical operations, was required to testify.

The son of a wheat farmer and honeybee keeper, Mauch grew up in Dunningen, in southwestern Germany. He completed a watchmaking apprenticeship while at a technical high school, and then, while earning a university degree in mechanical engineering, he fulfilled his practicums working at H&K in Oberndorf, 15 minutes from his home.

Belinda Padilla, head of U.S. operations at Armatix, says her mom was furious when she discovered her and her sisters with their dad's revolver as kids. "When my dad got home," she adds, "it was like World War III."

Upon graduation he became an H&K weapons designer, rising to head of its R&D unit in 1991 and head of all technical operations in 2001. In 2002 he became the first non-American citizen to be presented with the Chinn Award, a coveted annual honor conferred by a committee of the National Defense Industrial Association for significant contributions to the field of infantry weapons systems.

"Mauch listens to what the soldiers and Marines want," says Dave Broden, who heads the NDIA committee that made the award, "comes up with creative ways to meet their objectives," and "is great at drawing out the best in people, by building the right kind of collaborative team."

If that honor was the pinnacle of Mauch's career, the nadir may have been that product-liability suit, filed two years earlier. Testifying in a deposition via telephone, he was grilled for hours, as he remembers it. The questions were baffling to him at the time, he recounts in a telephone interview. (His English is good, but not perfect.)

"Look," Mauch remembers testifying, "if a policeman needs to defend himself, the gun needs to fire. If a boy uses it, the gun doesn't know. How would the gun know who handles it?"

Now 59, Mauch says he can't remember the outcome of the lawsuit. But what's "burned in my brain," he says, is that an accident involving an H&K gun killed a boy. He remembers thinking, "Now it's time to realize: Is it possible to get some intelligence in a gun to bring more safety?"

Then, in April 2002, a 19-year-old in Erfurt, Germany, shot 17 people to death at a high school. The massacre stunned the nation, which has strict laws governing gun possession and storage. In its wake, Bernd Dietel, who then co-owned the SimonsVoss electromechanical lock company, wondered whether his company could build a better gun lock. Seeking gun expertise, he reached out to H&K and was put in touch with Mauch.

IAN ALLEN

In 2004, Dietel formed Armatix (pronounced AR-matix in English, or ahr-MA-teeks in German) to make electromechanical gun locks. In 2005, Mauch left H&K, and in 2006 he joined Armatix, where he commenced work on a smart gun for the U.S. civilian market. (In late April, as this story was going to press, Mauch abruptly left the company under circumstances that are not yet clear.) The product would court a new category of gun buyer: young parents who wanted protection but feared having a firearm anywhere near children. A personalized .22-caliber pistol fit the bill. It was small and light, with minimal recoil—ideal for first-time gun owners.

No standards body, like Underwriters Lab, certifies the reliability of civilian guns. California and Massachusetts do require that a firearm, to be sold there, pass a shooting test. But they ask only that it fire 600 rounds with no more than six failures.

Mauch says the de facto industry norm for civilian handguns is around 5,000 rounds with no more than 50 failures. But at H&K and Armatix, he claims, he has hewed to a higher standard: no more than 10 failures in 10,000 firings. "We tested the iP1 with more than a quarter million rounds," he says. "You can use it in rain, dust, and mud."

The iP1 takes two AAA batteries, which will power about 5,000 firings, according to Armatix. An indicator light begins flashing when the batteries still have one-third of their life remaining—i.e., more than 1,000 shots. The watch takes a common button battery, and a watch-face icon monitors its depletion. If the battery is allowed to run out, the gun will not operate.

By mid-2013, Armatix had secured the federal and state approvals necessary to import its iP1 and sell it in all 50 states. It set the retail price at $1,798—a price that the NSSF's Keane calls "astronomical." (Many handguns sell for about $600.)

Responds Mauch: "It's up to people if they want to spend more money for more safety." If the iP1 protects the life of someone's child or grandchild, he says, that person may find the price reasonable.

Armatix then hired Belinda Padilla to head U.S. operations. Tall, slender, and plainspoken, Padilla is a former global sales director for AT&T. Her executive style is less Meg Whitman than Mona Lisa Vito, the Marisa Tomei character in *My Cousin Vinny*. She grew up in Los Angeles, but because of death threats doesn't want additional personal details divulged.

"This would have been the solution at my house," Padilla says of the iP1. Her father loved guns and kept a loaded revolver under the mattress. One day when she was about 7, she says, "my mom walked in and saw me and my sisters playing with the revolver, and when my dad got home it was like World War III."

Padilla began looking for dealers. She thought she had found the perfect one when she met James Mitchell, the owner of Oak Tree Gun Club in Newhall, north of Los Angeles. Mitchell was excited about the gun, she says, and wanted exclusive sales rights for California. She declined, but gave him a right of first refusal, she asserts.

She moved her office to Oak Tree and set up a shooting range there where customers could try out her gun. The range, painted blue, with Armatix signage, featured the company's unique Intelligent Range System. With this system, an iP1, when fitted with a simple add-on feature, will not fire unless

pointed within the arc of designated targets. The safeguard protects customers from aberrant shots by novices and makes it nearly impossible for a shooter to commit suicide—a recurring hazard at ranges.

The day after Thanksgiving in 2013, scores of Oak Tree customers lined up to try the iP1 at her range, she recalls. (She showed *Fortune* photos of the event.) Nearly every customer, Padilla says, filled out a form, asking to be notified when shipments came in.

In mid-February 2014 the gun finally went on sale, she says. In a congratulatory email, an Oak Tree employee sent her a photo, Padilla says, depicting her gun tagged for sale in a display case.

On Feb. 17 the *Washington Post* ran a story about the landmark day, quoting Oak Tree's Mitchell saying that the iP1 "could revolutionize the gun industry."

Two or three days later, Padilla got a call from a friend, she recounts. "Belinda, your signs are all gone," her friend said. Padilla drove to the club, and, sure enough, all Armatix signage had been taken down, her gun was no longer displayed, and her shooting range had been painted over green. "Like I never existed," Padilla says.

Soon thereafter, Mitchell's daughter Betsy told the online publication *Gun Rights Examiner*, "Our facility does *not* carry the Armatix pistol, never has, and [James Mitchell's] comment was taken out of context... by the *Washington Post*."

His accuracy impugned, the author of the *Post* story, Mike Rosenwald, published a follow-up article, including a photo of the gun apparently on sale, along with additional quotations from his original interview with Mitchell.

Had the NRA gotten to Oak Tree? A spokesperson for the group told *Fortune*, "I'm always reticent to say, did the NRA contact such and such a person. In addition to 500 employees, there are 5 million–plus members." He denied, however, that any of the group's senior national officers contacted Oak Tree.

In a brief telephone interview with *Fortune*, Mitchell said, "That project is over with us." Before getting off the phone he asserted that Oak Tree never sold the gun and added that a "person who worked for [Armatix] took a photo of it in the cabinet to make it look like it was on sale."

Padilla declined to comment to *Fortune* about her conversations with Mitchell after the first *Post* article, saying she wanted to "keep things positive."

A big clue to what had happened, though, can be gleaned from the Calguns.net website, which is still filled with angry posts from gun enthusiasts, many referencing a 13-year-old state law in New Jersey. To understand what that's about, we need to step back.

MODEL	HK416
AMMUNITION	5.56 × 45mm NATO
SUMMARY	Assault rifle reportedly used by Navy SEALs to kill Osama bin Laden

THE BIG GUNS OF THE MAUCH ERA

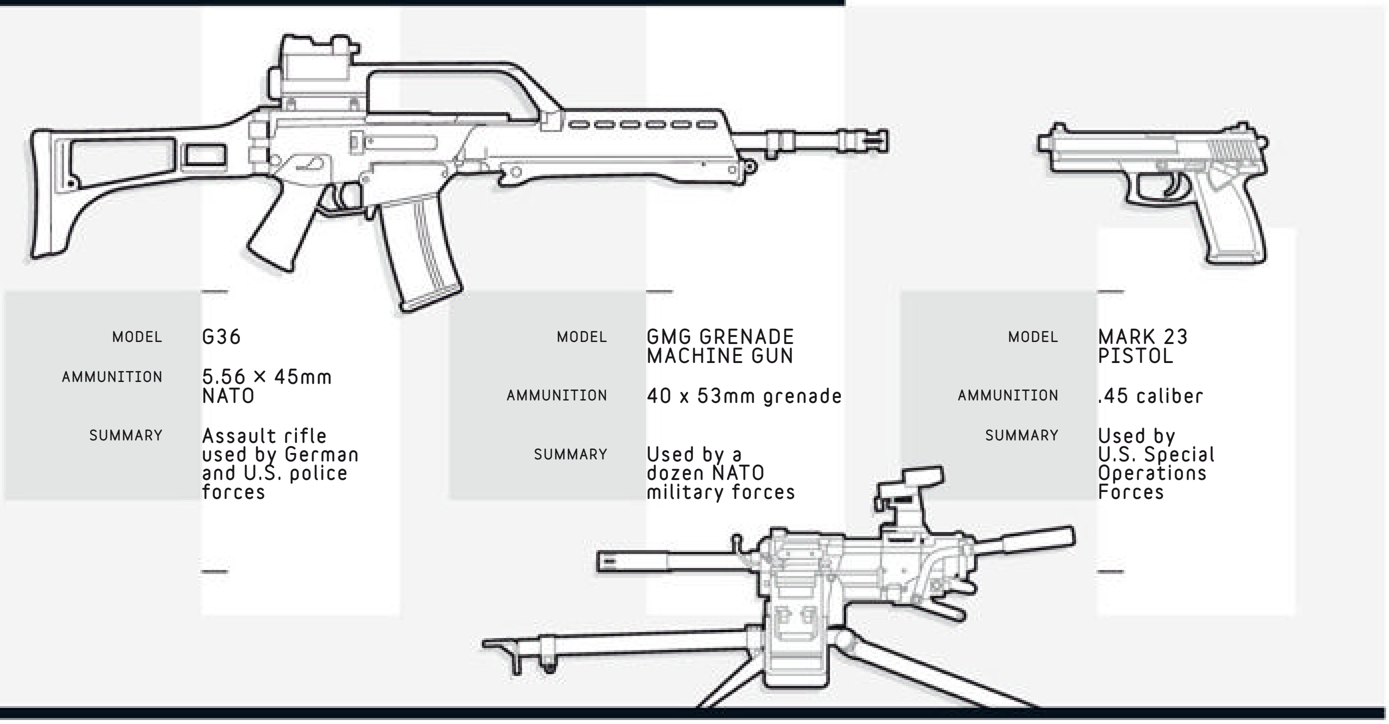
Ernst Mauch, who developed the iP1, was head of R&D and, later, all technical operations at Heckler & Koch when it developed these innovative weapons.

INVENTORS FIRST BEGAN patenting ideas for personalized guns in the mid-1970s. In 1994 the Justice Department commissioned a study of the concept as a possible way to reduce the number of "takeaway" killings of police officers—murders committed with the victim's own firearm. At the same time, public health advocates began championing the idea too.

For most products, either the Consumer Product Safety Commission or a specialized agency, like the National Highway Traffic Safety Administration, can force implementation of safety features. That's not true with guns. Congress withdrew the commission's jurisdiction over guns in the mid-1970s. Gun lobbyists feared that gun-control advocates would ban guns through the backdoor by mandating unachievable safety features.

So proponents of smart guns turned to legislation and litigation to force the industry's hand. In 1996, Johns Hopkins's Teret and three faculty colleagues drafted a model law to mandate adoption of smart-gun technology. A New Jersey gun-safety group reached out to Teret for advice and then worked with state representative Loretta Weinberg of Teaneck to draft a law for New Jersey. In 1997 she introduced a bill, called the Childproof Handgun Act.

Under its provisions, once the state's attorney general certified that a "personalized" gun was being sold anywhere in the U.S., the clock would start ticking, and three years later only personalized handguns could be lawfully sold in New Jersey.



At the time, Teret recalls, he felt that such a law would assure "manufacturers or tech people thinking of getting into gun safety that there might be a viable market for such a gun."

In fact, a couple of manufacturers were manifesting interest. Bought out of bankruptcy by a forward-thinking investor group in 1994, Colt's Manufacturing—bolstered with a $500,000 grant from the Justice Department in 1997—was developing a handgun that would work with an RFID-enabled wristband. At the same time, iGun Technology, a spin-off of O.F. Mossberg & Sons, was developing a personalized shotgun that employed an RFID-enabled ring.

For gun enthusiasts, however, the New Jersey bill confirmed their worst fears: Gun-control types really were trying to force these expensive, newfangled, unproven devices down their throats. A New Jersey NRA affiliate denounced Colt's for "standing with…the antigunners," as a 1999 *Wall Street Journal* article recounted, and later called for a boycott. Though the group backed down, one major Colt's dealer suffered a 20% hit in sales of Colt's products—$1.5 million.

Smart guns also played a cameo role in a massive litigation assault on the gun industry, patterned on the tobacco litigation. From 1998 to 2000 more than 30 municipalities sued the manufacturers seeking reimbursement of medical expenses for treating gunshot victims, and asking for reforms relating to gun distribution and design, including smart-gun technology. By 2000 the Clinton administration was threatening to pile on with its own suit against the industry.

That March, Smith & Wesson settled. Or, rather, tried to. It signed a deal with the White House, agreeing to a long list of reforms. Among other things, it would dedicate 2% of annual revenue to develop "authorized user technology," which it would install "in all new firearm models within 36 months."

Both the NSSF and the NRA caustically denounced S&W, with the NSSF asserting that it had "violated a trust with [its] consumers and with the entire domestic firearms industry."

Other gun groups called for a boycott, and S&W was struck with a whopper. Sales fell sharply, two factories were temporarily shut down, and 125 of the 725 employees at its Springfield plant were laid off. S&W began backing away from the deal almost immediately, and when George W. Bush won the presidential election that November, the agreement collapsed. The following May, Tomkins, which had paid $112 million to buy the company in 1987, sold it for just $15 million, plus debt absorption.

By that time, the two manufacturers that had been pursuing smart guns most avidly—Colt's and iGun—had each shelved their projects. "It was expensive to develop, we were a small company, and the idea met with limited enthusiasm from either side," recalls Donald Zilkha, the investor who ran Colt's at the time. Shotgun maker iGun got further, actually manufacturing 50 personalized shotguns between 1998 and 2000. But when it held a focus group on the idea, says company president Jonathan Mossberg, people kept saying, "I don't want any damn circuit board in my gun." (Recently, though, iGun has revived its business and is seeking orders.)

The matter was hardly over. In 2002, after a half-decade of legislative scrimmaging, New Jersey passed Loretta Weinberg's smart-gun bill into law.

When one gunmaker held a focus group on the idea of a smart weapon, people kept saying, “I DON’T WANT ANY DAMN CIRCUIT BOARD IN MY GUN.”

After the Oak Tree fiasco, Armatix’s Padilla looked for a new dealer. She was excited when she found Andy Raymond of Engage Armament of Rockville, Md., who was an Ernst Mauch buff. With his bulging, tattooed forearms and store full of assault-style weapons, Raymond was a gun guy to the bone. He believed that the iP1, by attracting a new category of gun owner to “our side,” would further the pro-gun cause, as he would later explain.

On May 1, 2014, shortly before he was to start selling the iP1, he gave a taped interview to MSNBC’s Chris Hayes. “It’s all about freedom,” Raymond told him. “So here’s the NRA—the bastion of great freedom—and they say this thing should be prohibited. How hypocritical is that?”

But before the Hayes clip could air, word got out, and the world came down on Raymond. He spent the night in his store, making sure it wouldn’t be burned down, as a telephone caller had vowed that it would be.

“Obviously I received numerous death threats today,” Raymond said in a video he posted on his Facebook page that night. “I really [expletive] appreciate that. That’s really [expletive] classy. Great thing for gun rights when you threaten to shoot somebody.”

The video—portions of which MSNBC’s Hayes later incorporated into his own revised segment—showed Raymond at his counter, smoking, a rack of assault rifles behind him, with a bottle of whiskey and a half-filled plastic cup near his right arm.

He would not be selling the iP1 after all, he said. “I believe my principles were correct,” he continued. “Unfortunately, maybe I was wrong. I don’t know. So the people of New Jersey, my apologies... If anything happens to me—if I resign or anything like that—I hope you don’t hold anything against my business partner or any of my employees.”

The ostensible bone of contention underlying the showdowns at Oak Tree and Engage Armament—the New Jersey law—quietly evaporated in November 2014, at least as to the iP1. The state’s acting attorney general ruled that he would not count the iP1 as “personalized” within the meaning of the act. (He reasoned that an unauthorized person could still fire it, at least temporarily, if he stole both an activated iP1 and the corresponding watch and held them together.)

In addition, after the Andy Raymond debacle, Weinberg—the original sponsor of the New Jersey law and now the majority leader of the state senate—publicly acknowledged that the time may have come to repeal her law. In an interview with *Fortune*, she says she expects some action before the end of this year. One possibility, she continues, would be to replace it with a statute that would simply require that if smart guns are available, New Jersey firearm dealers would have to offer at least one such model for sale.

The truth is, though, that the New Jersey law was never the whole issue. Many gun groups opposed smart guns before it was ever conceived. And even if it’s repealed, smart guns will still pose a threat to the gun industry. The NSSF’s Keane has candidly explained one reason on the group’s blog: “If a manufacturer were to overcome the significant technological challenges,” he wrote, “would they be exposing themselves to product-liability lawsuits alleging that all their other products that do not incorporate this technology are somehow ‘defectively designed’?... In our overly litigious society these are not merely theoretical liability concerns for product manufacturers.”

True enough. But what’s he suggesting? Is he signaling to his member companies that they should circle the wagons and freeze out these technologies?

“No, that’s not what I’m saying, and that’s not what that says,” Keane responds. “But as a lawyer who formerly represented manufacturers in product-liability lawsuits, I will tell you: If you put it on one model and have other models that don’t have it—for whatever reason—and that model gets involved in an accident, I assure you a plaintiffs lawyer is going to get an expert to say that that gun’s defective, because you coulda-shoulda put it on this gun. That is a reality of product-liability litigation in America.”

So, like gunsmith Doug somewhere in Nebraska, who started selling the iP1 in January, we’ll just have to wait and see if Americans buy these things, and if any American manufacturer will ever dare market one.

Mauch says he isn’t giving up.

“Think about it,” Mauch continues. “If your son would kill, with your gun, his best friend. It’s horrible. That happens. It happens very often. If there are other technologies available, we should not close our eyes.”

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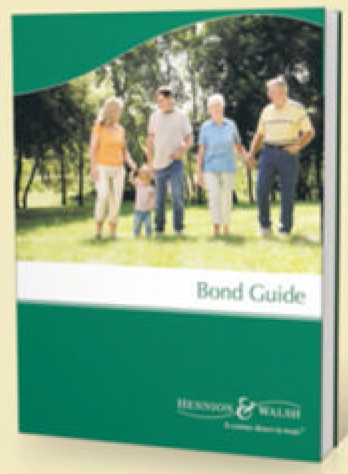

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BILLIONAIRES *VS.* BIG OIL

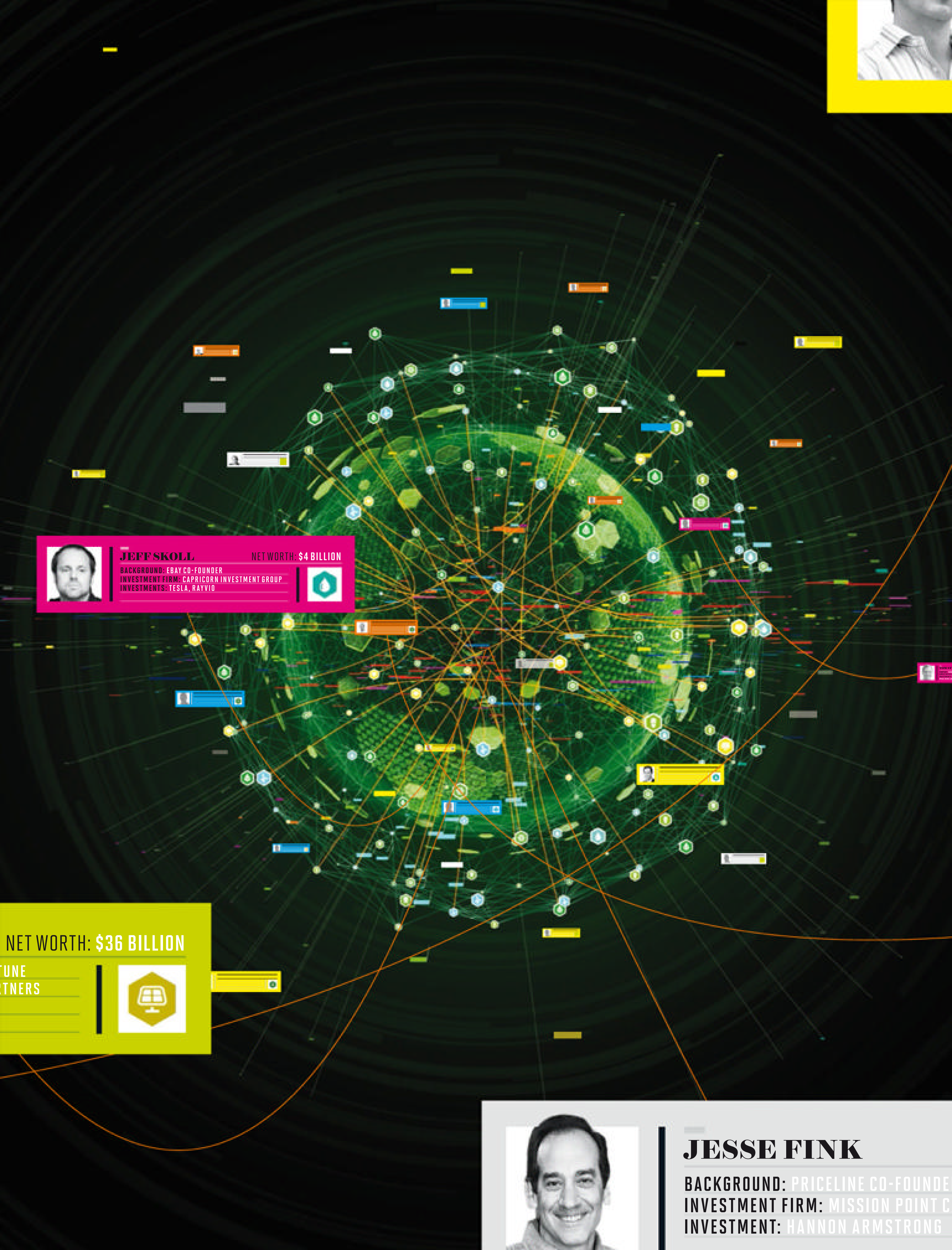
A GROWING NUMBER OF THE WORLD'S WEALTHIEST PEOPLE, FROM BOTH ENDS OF THE POLITICAL SPECTRUM, ARE BANDING TOGETHER TO BET ON NEW TECHNOLOGIES THAT COULD DISPLACE FOSSIL FUELS. THE ONE THING THEY HAVE IN COMMON? THEY BELIEVE IT WILL MAKE THEM A LOT OF MONEY.

by ***BRIAN DUMAINE***

ROB WALTON

BACKGROUND: HEIR TO THE WAL-MART FORT
INVESTMENT FIRM: MADRONE CAPITAL PAR
INVESTMENT: FIRST SOLAR

Illustration by ***VLADIMIR SHELEST***


JEFF SKOLL
NET WORTH: $4 BILLION
BACKGROUND: EBAY CO-FOUNDER
INVESTMENT FIRM: CAPRICORN INVESTMENT GROUP
INVESTMENTS: TESLA, RAYVIO
NET WORTH: $36 BILLION
TUNE
RTNERS
JESSE FINK
BACKGROUND: PRICELINE CO-FOUNDE
INVESTMENT FIRM: MISSION POINT C
INVESTMENT: HANNON ARMSTRONG

WARD MCNALLY never intended to become a booster for clean tech. The great-great-great-grandson of the founder of the 159-year-old Rand McNally map company, he helped sell the family business in 1997. McNally, 43, is now the co-founder and managing partner of McNally Capital, a Chicago firm that advises wealthy families on their private equity investments. His focus is making money, not being green. ¶ But one day in 2010 a billionaire client who'd made his fortune in oil came to McNally with a problem. The client had invested in a clean-tech company to hedge his family's core source of wealth: fossil fuels. "We started talking about clean tech," recalls McNally, "and although he thought it was a great investing opportunity, he complained about how complicated it would be for his family to enter the space." The billionaire lamented that he lacked the depth of knowledge to make sophisticated investment decisions about deals in areas like smart-grid infrastructure and solar and wind power, and he didn't want to take the time and incur the expense to build his own large team of professionals. The client asked what could be done. And that's when McNally suddenly had a big idea. "I thought," he says, "why not build a network of billionaire clean-tech investors who could share knowledge, share capital, and share deals to achieve their goals?"

Ward McNally created the Clean Tech Syndicate after one of his wealthy private equity clients began asking for advice on how to put money into next-generation technologies.

A few months after that meeting, McNally created the Clean Tech Syndicate. The Chicago-based investment group now consists of a pool of 11 family offices—including the oil billionaire's—that wish to invest in the clean-tech space. In total, the families have a net worth of some $60 billion. So far the syndicate has pledged to invest $1.4 billion in clean tech, and McNally says it has already put "hundreds of millions" to work. What he won't divulge is the identity of the 11 families behind the syndicate. Like many in the 1% of the 1%, the members jealously guard their privacy.

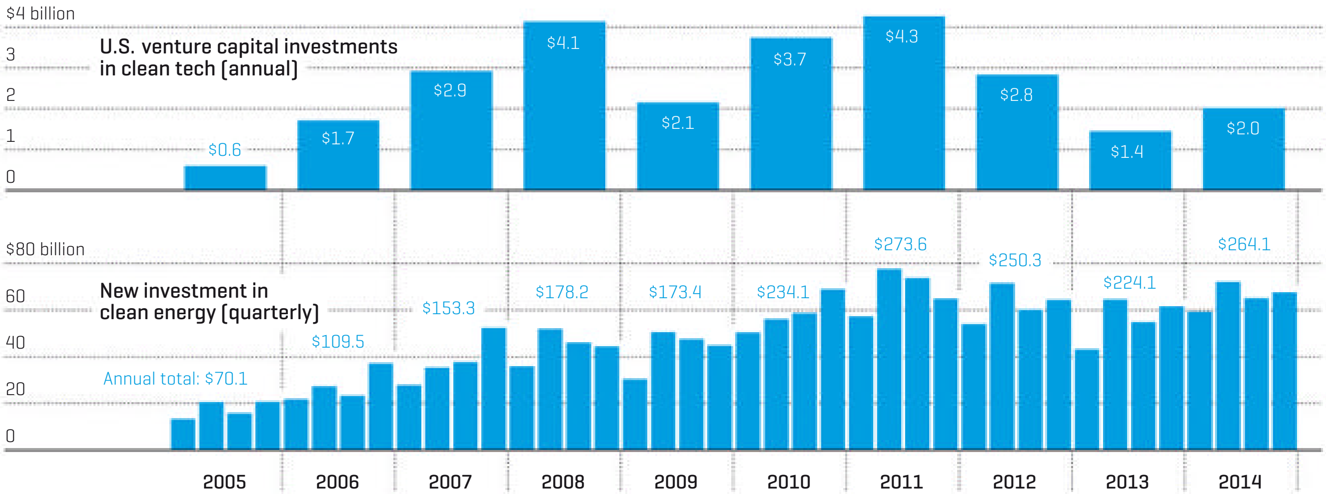
The existence of the Clean Tech Syndicate is just one example of an important, emerging trend in the world of energy finance: America's ultrawealthy class has begun to put its money to work in clean tech in a big, big way. Some of these billionaires feel duty-bound to use their fortunes to combat climate change. Others are putting money in mainly because they see it as one of the biggest investment opportunities of the 21st century. Some do it for both reasons. Whatever the motivation, they all expect to make a healthy profit. Says Nicole Schuetz, who conducted one of the rare studies on the topic for the nonprofit Energy Innovation: "Every family office I spoke to expects to make competitive or above-market returns. They are protecting their wealth for future generations."

Who exactly are these super-deep-pocketed investors? No definitive list exists, but months of reporting by *Fortune* turned up plenty of interesting names. Nicholas Pritzker, whose family made billions building the Hyatt Hotel chain and who is personally worth $1.5 billion, is an active clean-tech investor. Through his Tao Capital Partners, Pritzker has made early investments in Tesla Motors and Solar City. Amway heir Dick DeVos, a rock-ribbed Republican, has put money into a com-

MCNALLY: PETER WYNN THOMPSON—NEW YORK TIMES/REDUX; PREVIOUS SPREAD, HEINZ: MARIO TAMA—GETTY IMAGES; SKOLL: JAMIE MCCARTHY—GETTY IMAGES; WALTON: SARAH BENTHAM—BLOOMBERG VIA GETTY IMAGES; FINK: MARDI WELCH DICKINSON—KYMRY GROUP

FILLING A VOID

In the past few years venture capitalists have begun to pull back on clean-tech investments because of the long time horizons involved, creating an opportunity for wealthy families to step in. Globally the amount of money going into clean tech is on the rise; much of it is flowing into financing for large-scale solar or wind projects.



BOTTOM CHART: EXCLUDES CORPORATE AND GOVERNMENT R&D, AND SPENDING FOR DIGITAL ENERGY AND ENERGY STORAGE PROJECTS. GRAPHIC SOURCES: PRICEWATERHOUSECOOPERS, BLOOMBERG NEW ENERGY FINANCE

pany that seeks to convert energy from waste into electricity. In addition to McNally's group, another large network of wealthy clean-tech investors is a group called Cleantech, Renewable Energy, and Environmental Opportunities (CREO), which brings together some 50 family offices with a total of $50 billion in investable capital. The organization holds regular off-the-record meetings to discuss opportunities in clean tech as well as in areas such as wastewater, wetlands restoration, carbon credits, and sustainable agriculture. Billionaire investor Jeremy Grantham and eBay co-founder Jeff Skoll, who was a producer of Al Gore's documentary, *An Inconvenient Truth,* have sent their representatives to meetings. (For more billionaire investors, see "Clean Tech's Big Guns" on the next page.)

Investment in clean energy by the ultrarich is not unprecedented. For years a handful of high-profile activists fighting climate change, such as Bill Gates, George Soros, Richard Branson, former New York City mayor Michael Bloomberg, and Tom Steyer, a billionaire hedge fund manager, have been supporting the clean-energy cause mostly through their philanthropies. They have also invested for their own book on occasion. (The most famous example is Gates' backing of TerraPower, which is attempting to create a new, safer generation of nuclear power plants.)

What's new is that a small but growing number of behind-the-scenes billionaires are now pouring serious money into clean-tech companies and projects in pursuit of profit—all part of a big bet that the world will transition to a low-carbon economy in coming years.

"The families in the syndicate," says McNally of his clients, "see clean tech as a macro-driven thesis that includes water scarcity, clean air in China and India, and the need to reduce energy consumption because of a growing population." When you read about severe droughts in the American West or a falling water table in China, why not invest in nanotech filters that promise to clean wastewater, or in energy-efficient ways to desalinate our oceans? Many energy-related industries, including utilities, automotive, lighting, water, and food, are ripe for similar technological disruption. "These new clean-tech markets are some of the fastest growing in the U.S.," says Adam Wolfensohn, the son of former World Bank president and investor James Wolfensohn, whose family office is part of the CREO network, "and will leapfrog the old economy."

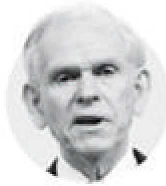
Powerful forces are skeptical of that feel-good narrative, however. In the U.S., conservative politicians have accused some of these well-heeled investors of living off clean-tech subsidies from their friends in the Obama administration. Last summer the Senate Environment and Public Works Committee, chaired by noted climate-change denier James Inhofe (R-Okla.), issued a 67-page report called "The Chain of Environmental Command: How a Club of Billionaires and Their Foundations Control the Environmental Movement and Obama's EPA." Among Inhofe's campaign contributors are the brothers Charles and David Koch, who run Koch Industries and whose vast fortunes were built on fossil fuels. The *New York Times* reported that they will spend nearly $889 million trying to defeat Democratic candidates in the next election—in the process supporting politicians who they believe will protect the status quo.

Big Oil doesn't appear eager for an energy revolution either. The industry embraces clean energy in its marketing campaigns but at the same time downplays its potential impact, arguing

CLEAN TECH'S BIG GUNS

Some billionaire clean-tech investors like Tom Steyer and Jeremy Grantham are very public about their activities. Most others are press-shy. They all have one thing in common: that providing clean energy, air, and water is one of the biggest investing opportunities of the 21st century.

TOM STEYER
The most outspoken of the green billionaires, Steyer, co-founder of the Farallon hedge fund, has invested his money in sustainable-resources play EFW Partners.



JEREMY GRANTHAM
The co-founder of the $116 billion GMO fund is putting his own money into sustainability, including solar and energy-efficiency company Next Step Living.

ANDRE HEINZ
Through his Sustainable Technology Fund, the ketchup scion has invested in the Swedish biofuels maker Reac Fuels and wind developer Triventus.

NAT SIMONS
The son of hedge fund billionaire James Simons founded Prelude Ventures. Investments include Aquion, a maker of storage batteries for the power grid.

◂ Public About Investing in Clean Tech

that solar, wind, and other clean technologies will take many decades to scale, if they ever do. The perspective of oil company CEOs can't help but be influenced by the daunting calculus of the energy economy. An estimated $27 trillion of fossil fuels remains buried in the ground. And if the world is to meet its climate goals, according to the scientific community, most of that black gold will have to stay there. Exxon Mobil, Chevron, and Shell—not to mention the Saudis and the Russians—seem unlikely to want to leave that kind of money on the table.

If the world is going to move away from a fossil-fuel economy in time to slow the effects of global warming, billionaire investors will need to play a key role.

The surge of interest in clean tech by wealthy individuals and families comes even as some professional investors are turning away from the sector. Many venture capitalists and institutional investors have become wary of clean tech because of its long investing horizons and deep need for capital. In the U.S. total VC spending on clean tech fell from a peak of $4.3 billion in 2011 to $2 billion last year, according to the consultancy PWC.

Wealthy family offices are perfectly positioned to fill that gap. And they aren't scared off by the long-term commitment. In fact, the opposite is true. "Many families, including ours, make clean-tech investments because there are tremendous opportunities in this space for investors with sufficiently long time horizons," says Nat Simons, whose father, James Simons, founded hedge fund Renaissance Technologies and accumulated a net worth of $14 billion. Today the younger Simons, who is deeply concerned by climate change, invests family money through his San Francisco investment fund Prelude Ventures—but always, he says, with a sharp eye on the bottom line.

No one knows exactly how much money family offices are sinking into clean tech. But we do know that clean-tech investing is on the rise globally. J.P. Morgan and the nonprofit Global Impact Investing Network (GIIN) recently issued a report showing that 125 global-impact investors—including funds and endowments that put money into clean tech, sustainable food, and other forms of socially responsible investing—planned to increase their investing commitments by $12.7 billion in 2014, up 19% from the year before. Collectively the investors have put $46 billion to work. Family offices represent a small portion of that total.

A healthy share of such money is being used as venture capital. Rob Day, who runs the Boston operation of Black Coral Capital, a family office that helped found the Clean Tech Syndicate, estimates that in the U.S. last year family investment funds supplied as much seed money as the established VC players such as Kleiner Perkins, DBL Investors, and Rockport Capital. "Family investors have grown fatigued with paying 2% of their assets and 20% of their profits to venture capital firms and hedge funds," says Day, "so they're investing in clean tech directly on their own."

Geoff Chapin, the founder and CEO of Next Step Living, a Boston-based solar and energy-efficiency startup, can testify to the benefits of having billionaire VCs get interested in your technology. Chapin had angel funding, but his company really didn't start scaling until Black Coral decided to fund its Series A round in 2010. After that, the family office became heavily involved in helping the company succeed. "Black Coral introduced us to 30 more potential investors, helped us raise a total of $70 million, and guided us on governance issues," says Chapin. Other family offices later followed Black Coral in putting money into Chapin's company, including Eastern Sun Capital Partners, backed by billionaire investor Jeremy Grantham. In 2014, Next Step Living hit $100 million in sales, up 70% from the previous year.

Clean-tech investing generally falls into two broad categories. There's venture capital, which provides the seed money for risky startups. And then there's project financing, which provides the cash for huge projects such as utility-scale wind and solar farms,

STEYER: DAVID PAUL MORRIS—BLOOMBERG VIA GETTY IMAGES; GRANTHAM: JULIEN WARNAND—EPA/CORBIS; HEINZ: MARIO TAMA—GETTY IMAGES; SIMONS: COURTESY OF SEA CHANGE FOUNDATION

PIERRE OMIDYAR
The eBay co-founder started Ulupono to back clean-tech initiatives. Investments include bio-jet-fuel maker Rentech and EV network installer Volta Industries.

NICHOLAS PRITZKER
The Hyatt Hotel heir invests in clean tech through his San Francisco firm Tao Capital Partners. His winning bets include EV maker Tesla and Solar City.

GREG PENNER
Married to the daughter of Wal-Mart heir Rob Walton, he is a partner in Madrone Capital. Bets include $100 million in View, a maker of energy-efficient windows.

DICK DEVOS
The ex-CEO of Amway and son of its founder invests in clean tech via the Windquest Group, a backer of ElectraTherm, which turns waste heat into electricity.

water-desalination plants, and energy-efficiency projects.

Spending on project finance dwarfs the dollars put into venture capital and is considered a less risky investment. Last year, according to Bloomberg New Energy Finance, some $264 billion was invested globally in clean tech, the vast majority via project financing. That total sounds impressive until you learn that the International Energy Agency estimates that we need to invest $1 trillion a year if we are to decarbonize the economy fast enough to mitigate the worst effects of climate change. That target is known as the "clean trillion."

Family offices can't make up all of that gap, but they can help fill it. "There's a mismatch between VC funding and the capital-intensive needs of energy technology," says Nicholas Eisenberger, managing partner of the strategic advisory firm Pure Energy Partners. "You've got to get to scale to have any impact, and families play an important role in filling that gap." In total, single-family offices hold an estimated $1.2 trillion in assets, and multifamily offices manage another $500 billion, according to the consulting firm Family Wealth Alliance. Only a small fraction of that goes into clean tech right now, but the figure is growing, say experts. The appeal is that by providing project financing to big solar and wind projects, investors can reap a healthy 10% to 15% annual return without an inordinate amount of risk. That's because, for example, solar and wind farms secure long-term agreements—typically 20 years—with utilities to buy their power.

But finding the right projects and getting them off the ground can be tricky. Says Dan Reicher, the executive director of Stanford's Steyer-Taylor Center for Energy Policy and Finance, which was funded by billionaire fund manager Steyer: "There are lots of opportunities to do well and to do good, but also a lot of ways to make mistakes." Raising development capital for a large solar or wind project, he explains, is not a simple matter. "You might need $20 million or $30 million just to get a project on the road and then $1 billion more to finance it," says Reicher.

Family offices are about to get a big boost from the Obama administration, which in February announced that the Department of Energy will provide support and access to federal clean-tech R&D to a broad range of private investors and philanthropists. The aim of the program, called the Clean Energy Investment Initiative, is to help wealthy investors mobilize $2 billion in new clean-tech investments.

Despite the growing number of well-heeled clean-tech investors, making a dent in climate change remains a steep challenge. According to the UN's Intergovernmental Panel on Climate (IPCC), the world's known remaining supply of oil, gas, and coal would, if burned, generate 3,863 gigatons of carbon dioxide, the most prevalent greenhouse gas. To put that in perspective, we've already emitted about 580 gigatons of CO_2 over the past 150 years to power the Industrial Age. If we are to avoid the worst consequences of climate change—which means the planet cannot warm any more than 2° C this century—the world can use up only about a third of its proven fuel reserves by 2050. This is what industry analysts refer to as stranded assets. At the rate we're currently burning fossil fuels, we'll burn through our budget well before that.

What does that mean for the fossil fuel industry? The nonprofit Carbon Tracker Initiative estimated in a recent study that the market value of the top 100 public oil and gas companies and the top 100 public coal companies exceeds $7 trillion, equal to about 12% of the global public equity market. Add in the assets of state-owned energy companies such as Saudi Aramco, PetroChina, and Russian's Rosneft, and the total global market value of proven fossil-fuel reserves hits $27 trillion. If the IPCC is right and two-thirds of the world's supply of fossil fuels must stay in the ground, that would amount to a staggering $18 trillion write-off.

Big Oil doesn't see it happening. Exxon Mobil, which employs an army of smart analysts to study energy demand, says that by 2040 the world will still depend on fossil fuels for 75% of its energy needs. What these oil-industry analysts understand and many others don't is just how vast our energy system has grown and how addicted the world has become to cheap, dependable energy. Globally we burn 93 million barrels of oil a day, and demand for coal continues to grow in the developing world. China, India, and other emerging economies are installing coal plants because they provide cheap, dependable energy

OMIDYAR: TONY CENICOLA—NEW YORK TIMES/REDUX; PRITZKER: STEVE JENNINGS—GETTY IMAGES; PENNER: SCOTT EELLS—BLOOMBERG VIA GETTY IMAGES; DEVOS: REX LARSEN—THE GRAND RAPIDS PRESS/AP

that can help lift people out of poverty. The World Resources Institute says that roughly 1,200 more coal plants are still on the drawing board, almost all of them in the developing world.

So far renewables have been dwarfed by fossil fuels. Solar and wind together, for example, count for less than 5% of total U.S. electrical generation, and advanced biofuels a negligible portion of transportation fuel. In a recent speech Shell CEO Ben van Beurden argued that rising energy demand—especially in China and India—will keep the oil companies in business for a long time: "The 'stranded assets' thesis underestimates the significance of rising energy demand. It underplays the role natural gas will perform in the global energy system—especially in replacing coal power plants. And it ignores the potential of innovations like carbon capture and storage."

In the political realm, conservatives who back the fossil-fuel industry argue that technologies such as solar and wind are more expensive than coal and natural gas, and are therefore job killers. You simply can't grow the economy, they say, without producing lots more carbon. But in 2014 global GDP grew 3%, while carbon dioxide emissions flatlined, after rising 2.5% the year before, according to the International Energy Agency. Some of that CO_2 reduction was caused by slowing economies in Europe and China. A great deal of it, though, was due to a record amount of solar and wind installed globally, a rise in automotive gas-mileage performance, and aggressive energy-efficiency programs—all evidence that it's possible to stimulate economic growth without increasing pollution.

Many wealthy investors who are concerned about climate change believe that the fossil-fuel industry and its political backers are on the wrong side of history, and that the crucial $18 trillion in fossil fuels are destined to become stranded assets. Says one green billionaire who is actively investing in clean tech: "The fossil-fuel interests are trying to marginalize us, and we can't let that happen."

What makes these investors confident that they can take on Big Oil? Shifting political winds for one. Of late, many nations are finally getting serious about limiting carbon. Witness the agreement last fall between President Obama and China's President Xi to reduce greenhouse-gas emissions. In December, 196 countries will gather in Paris prepared to sign a new climate-change agreement to replace the Kyoto Accord. While the tougher new CO_2 standards will be voluntary, the mere existence of a new agreement that will include the U.S. and China, the world's two biggest emitters of CO_2, suggests that the international community is getting religion on global warming.

In the U.S., Congress has done little on climate change, but the Obama administration, using its executive power, has dramatically raised vehicle mileage standards and is set to place strict CO_2 emissions limits on the nation's 580 coal-fired plants. Action is taking place on the state level as well, including Gov. Jerry Brown's recent pledge to make California's power sector 50% renewable by 2030, up from around 20% today.

At the same time, some institutional money is starting to have second thoughts about investing in fossil fuels. The Rockefeller Brothers Fund and Stanford University are divesting from coal, and city and state pension funds might not be too far behind. The small amounts divested so far are unlikely to have any serious short-term impact on Big Oil or Big Coal, but the popularity of the divestiture movement is a reflection of a growing anti-fossil-fuel sentiment—especially among millennials, who feel, rightly, that the baby boomers are leaving them a climate in crisis.

Perhaps more threatening to the fossil-fuel industry are campaigns by environmental groups such as the Rainforest Action Network to put pressure on banks not to lend to companies that worsen global warming or defile the environment. In March, PNC Financial, the nation's seventh-largest bank, said it would no longer finance coal-mining companies that pursue mountaintop removal of coal in Appalachia. Bank of America, Citigroup, Morgan Stanley, J.P. Morgan Chase, Wells Fargo, Credit Suisse, and others have already started to phase out their financing of mountaintop coal-mining companies. When climate-minded investors such as Stanford University divest coal stocks, someone else who doesn't care about global warming will just buy the shares. But when banks refuse to finance projects, it can pose an existential threat to an industry.

The only way for concerned billionaires to prove the entrenched powers wrong will be to ramp up investments in clean-energy technologies that have the potential to rival fossil fuels in cheapness and efficiency—a tall order. Another thing that might help is for more ultra-deep-pocketed investors to simply step out of the shadows and let the world know what they're doing and why. If word spreads that the world's wealthiest people are planning to get even richer by investing in clean energy, the idea might really catch on.

A worker installs a photovoltaic panel at a First Solar site in California. First Solar's early investors include members of the ultrawealthy Walton family.

SAM HODGSON—BLOOMBERG VIA GETTY IMAGES

THE WAR ON CANCER TURNS PERSONAL

New testing strategies from Biodesix lead the way in precision medicine.

METASTASIS, MALIGNANT, BIOPSY, markers, predisposition: This is the unfortunate and unwillingly adopted vocabulary of a cancer patient. Each of these words, as ominous as the C-word itself, weighs significantly in the patient's fate.

One of the most darkly ambiguous strings of them all is this: "We'll see how you respond to the treatment." But if the team at molecular diagnostics firm Biodesix® has its way, uncertain and noncommittal words will not be uttered in cancer treatment centers again.

The Boulder-based company is creating tests that can accurately predict if groups of patients will or will not respond to given treatments. Through advanced protein analysis—initially with patients battling lung cancer, perhaps the most devastating form of the disease—Biodesix hopes to reshape patient care and ultimately slash health care costs.

"There's no reason for a doctor to experiment on a patient to see if they've got it right," Biodesix CEO David Brunel explains. "We have the tools to assess many biological measurements at once, allowing you to see beforehand what will and won't work for a group of patients. We can improve diagnosis and improve patient outcomes while dramatically lowering costs."

Biodesix's noninvasive blood test, VeriStrat®, uses mass spectrometry technology to analyze the proteins that result from the body's efforts to battle advanced non–small cell lung cancer. "This test looks for a subset of eight proteins that, if present, can signal that the patient will benefit from chemotherapy over an oral therapy. We have preliminary evidence that in these cases, the tumor may be using an alternative growth pathway," says Jasmine Gruia-Gray, Ph.D., the company's vice president of marketing. "[A doctor] can treat the patient with the right drug at the right time based on what the disease is actually doing. They can work to outsmart the cancer."

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KPMG *presents* **LEADERS IN THE CLUBHOUSE | EXECUTIVE WOMEN + GOLF**

Carla Harris

Vice Chairman and Managing Director, Morgan Stanley

IN ADDITION TO HER LEADERSHIP duties at Morgan Stanley, the firm she joined straight out of Harvard Business School 27 years ago, **Carla Harris** chairs the National Women's Business Council, a position she was appointed to by President Obama. Harris is also the author of two books, *Expect to Win* and the new *Strategize to Win*, as well as an accomplished gospel singer. Between these endeavors, speaking engagements and her work as a board member for several community organizations, Harris still finds time to work on her golf game whenever she can.

—interview with Evan Rothman

Are you a big believer in golf as a business tool? It's an amazing tool if you have a client who loves golf. When you offer someone the chance to play, even though you may still wind up talking about business, you're doing it in the context of something they really enjoy. It changes the dynamic and the tenor of the conversation.

Does golf play a role in your efforts to help women move up the corporate ladder? Absolutely. In the summer, I try to find a group of junior women in the company who either play golf or are interested in playing and take them out. Because golf isn't intimidating at all if you're with someone who is patient and can tell you the in and outs of the game.

The distinction between a mentor and a sponsor is important to you. Can you explain why? A mentor is the person you tell the good, bad and ugly, someone you can share the intimate details of your career with. A sponsor is the person who behind closed doors will argue passionately as to why you should get the next great opportunity. It's important for women to have both. Your ability to move up will depend on somebody's judgment of whether you're ready or whether you'll be successful, and those judgments are directly influenced by sponsor relationships.

Why is it important to have women in the C-suite? It emphasizes that this is a company that gets it—they want the best talent. That will be inspirational to other women coming up the chain. Women also foster and encourage collaboration. You need to be able to harness many different ideas, which means encouraging people to take risks and contribute. Women have the demeanor of inclusiveness that will attract this kind of behavior.

What should companies do to help break the glass ceiling? Be intentional about recruiting women and making sure that the emerging workforce is aware of, and educated about, the power of your opportunity. Be intentional about how you move people around and bring them through the company. Lots of companies are good at recruiting, but retention is the big challenge. Retention is all about engaging with your workforce in a way that you understand what they're looking for. The third thing is to make sure that they have the right kind of sponsors or that you've created an environment where the sponsor relationship can develop.

So you've been on both sides of the sponsor relationship? Sure. In my opinion, if you have the experience, the relationships, and the capabilities, you have the responsibility to sponsor and mentor when you can, especially if someone has done the same for you.

Harris has introduced other women in her company to golf as part of her efforts to help them move up the corporate ladder.

PHOTO COURTESY OF MORGAN STANLEY; ©2015 TIME INC.


Here's to breaking more glass ceilings.
From boardrooms to the golf course, and everywhere else, the sky is the limit for women pursuing their goals.
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You Can't 'Stand' Business

Medical research says sitting is death. But there's no joy in working upright. What to do?

By Stanley Bing

A RECENT STUDY from the *American Journal of Preventive Medicine* concluded that sitting for long stretches increases the odds of an early death. Excessive sitting reportedly leads to a variety of lethal diseases that will kill you way earlier than whatever eventually gets your average mail carrier or dog walker. Even daily exercise doesn't seem to help if most of what you do involves sitting.

I saw this in a blog from the Harvard Medical School—just one of the nuggets deposited in my digital punch bowl that day. Don't ask me why it was there. I'm sorry it was. I was sitting down when I read it, and it upset me very much. After all, most of what I do and have done for a long time involves sitting. On the train or in a car going to and from work. At my desk for hours on end. At the restaurant for lunch. In the evening, ruminating over the day's events, a glass of something congenial on the table. Sitting! I enjoy it. More than standing, even. Like, if I have a choice between sitting and standing? I'll take sitting any day. And when I'm not sitting, I'm generally lying down. Does this mean I am headed for an early death, along with just about everybody I know?

I don't think so. What's clear is that the implications of an unhelpful study like this have to be rationalized immediately if full enjoyment of our lifestyle is to be restored. The good news is that I believe this can be done. The findings, in my opinion, are bogus. It's not the sitting that's the culprit here. It's what we're doing while we're sitting. That's what we need to attack. Potentially harmful activities include:

Worrying. Fully 65% of what I'm doing when I'm sitting involves digesting some anxiety-producing topic that's bouncing around in my gut. The fact that I'm sitting when I'm doing it is the only pleasurable part of the whole exercise. If I had to stand while I was worrying, the whole thing would be intolerable. We just need to worry less, that's all. At least while we're sitting.

Problem solving. Occasionally during my worrying, somebody presents me with a problem. This produces stress, which is a well-known cause of death, even in mice.

Looking at spreadsheets. Then there's the boredom that comes with inescapable duties. A recent study found that intense tedium is a major contributing factor in the desire for an early death. I just made that up. But I'll bet we could pay for research that would find that.

Talking on the phone. Young people and savvy boomers have found a solution to this health hazard. They just incessantly text one another all the time. It's more secure than email and conveys far less annoying information.

Consuming "healthy" food and drink. What are we supposed to do? Eat while walking around? I don't think so!

Dealing with people in your face. Now here's a problem with a simple solution, particularly if you're in management. Remove the offending face, right? There! That's better.

Reading distressing stuff on the web that doesn't help you in your life and leads to nothing but disquiet and a lethal feeling of powerlessness and dejection. That's easy enough to stop. And we should.

Seriously, are we to get one of those silly standing desks that make you look like you're the captain of a proud vessel, chained to the mast and heading off into the unknown polar climes? This doesn't work for me. It eliminates one of the main pleasures of daily working life, which is sitting. How about a treadmill desk? Again, I think not. The metaphorical message of trudging while you work is too odious to consider.

I know. I'm going to sit down, have a cup of coffee, and put the entire question from my mind. There's just so much of this daily digital load that a person should be forced to stand. And what I don't know can't kill me. Yet. ■

Follow Stanley Bing at stanleybing.com and on Twitter at @thebingblog.

ILLUSTRATION BY ALEXANDER VAN DAALEN; MAN IN CHAIR: ALAMY; WOMAN WITH MEGAPHONE: ISTOCK

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Dell recommends Windows.
The world's most secure 2-in-1.
A new Intel®-based PC starts in a flash, has the power to do more and is less expensive than you think.
The new Latitude 13 7000 2-in-1 is a lightweight Ultrabook™ and a detachable 13-inch tablet in one powerful and secure device, featuring Intel® Core™ M Processors. Built so you can work how you want, where you want.
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